Alton Coal Development, LLC.

Summary of PM_{10} Data Collected at Coal Hollow Mine, Utah During the Fourth Quarter, 2016

Submitted to:
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Alton Coal Development
Coal Hollow Project

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1.0 INTRODUCTION

This report summarizes measurements of Particulate Matter less than 10 microns nominal aerodynamic diameter (PM_{10}) collected and processed by Alton Coal Development, LLC, (ACD) from the five monitoring stations located at the Coal Hollow Mine Facility in Alton, Utah. Monitoring for PM_{10} is a condition of the mines operating permit.

PM_{10} monitoring at the site consists of five BGI PQ200 PM_{10} monitors run by solar power. Figure 2 of this report shows the approximate locations of the monitoring locations. The BGI PQ200 monitors are EPA Reference Method monitors and are operated on the National Particulate 1-in-6 Monitoring Schedule. The data summarized herein covers the data collected during the fourth quarter of 2016.

2.0 SITE LOCATION

The Coal Hollow Mine is located in Kane County, Utah, approximately three miles southeast of the town of Alton, Utah. Figure I on the following page gives an overview of the site location. Specifically, the Coal Hollow Mine is located in Sections 19, 20, 29, and 30 of Township 39S, Range 5W; with an approximate facility location of:

Northing: 41401699 meters

Easting: 371534 meters

Universal Transverse Mercator (UTM) Datum NAD27, Zone 12

The three monitoring locations as depicted in Figure 2, are located in positions to collect both background and maximum PM10 concentrations. The background monitor has a manufactures serial #962, therefore this monitor will be referred as monitor 962A. The compliance monitor for the Coal Hollow Mine (CHM) has a manufactures serial #963, therefore this monitor will be referred as monitor 963B. The co-located monitor has a manufactures serial #964, therefore this monitor will be referred as monitor 964C. The background monitor coordinates are Northing: 4140856, Easting 373119, (UTM) Datum NAD27, Zone 12. The CHM compliance monitor and the co-located monitor coordinates are Northing: 4140396, Easting 371147, (UTM) Datum NAD27, Zone 12. The compliance monitor for the North Private Lease (NPL) has a manufactures serial #2366, therefore this monitor will be referred as monitor 2366D. The co-located monitor has a manufactures serial #2398, therefore this monitor will be referred as monitor 2398E. The NPL compliance monitor and the co-located monitor coordinates are Northing: 4141570, Easting 370928, (UTM) Datum NAD27, Zone 12.

Figure 1 - Site Location Map

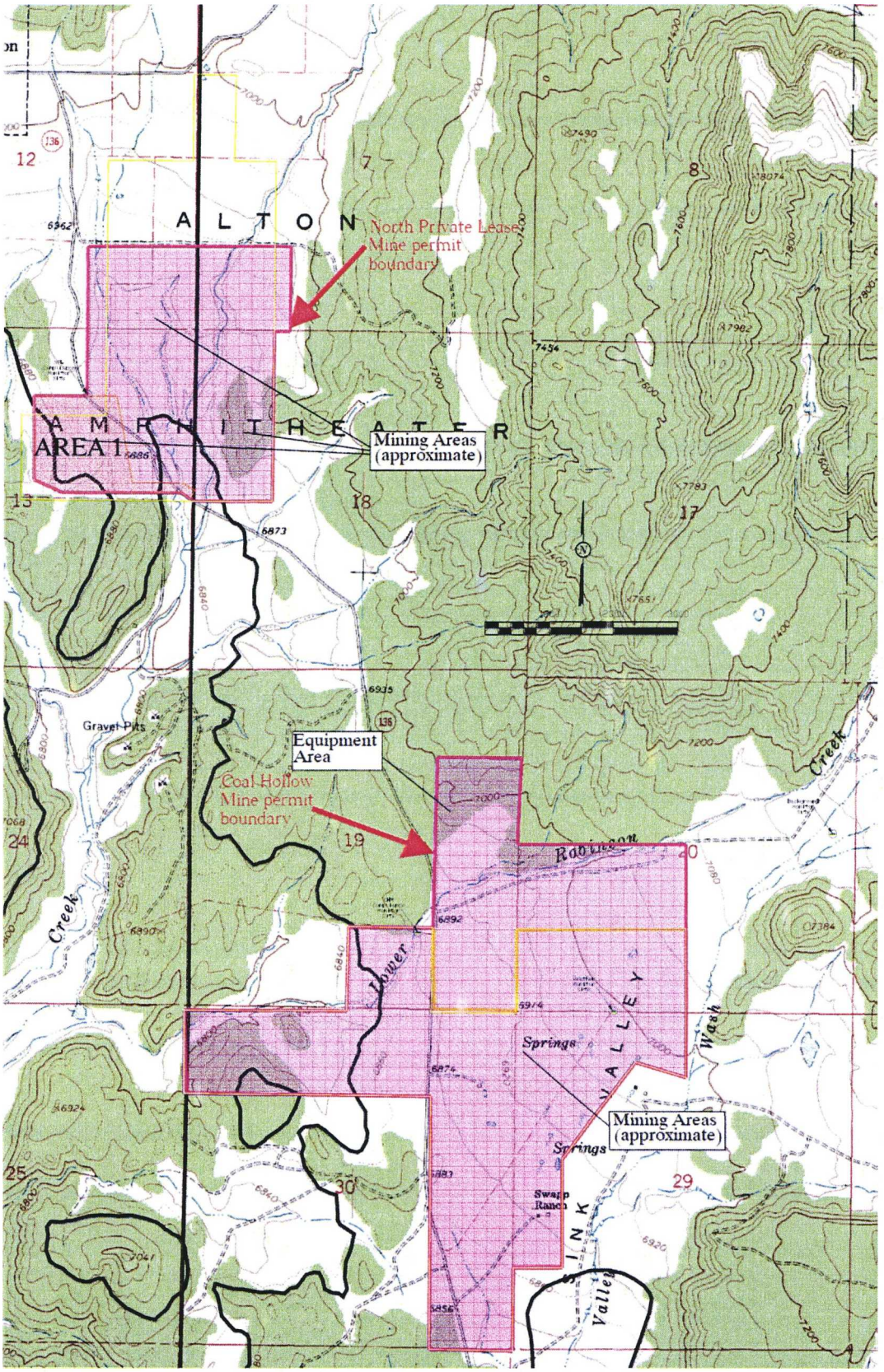
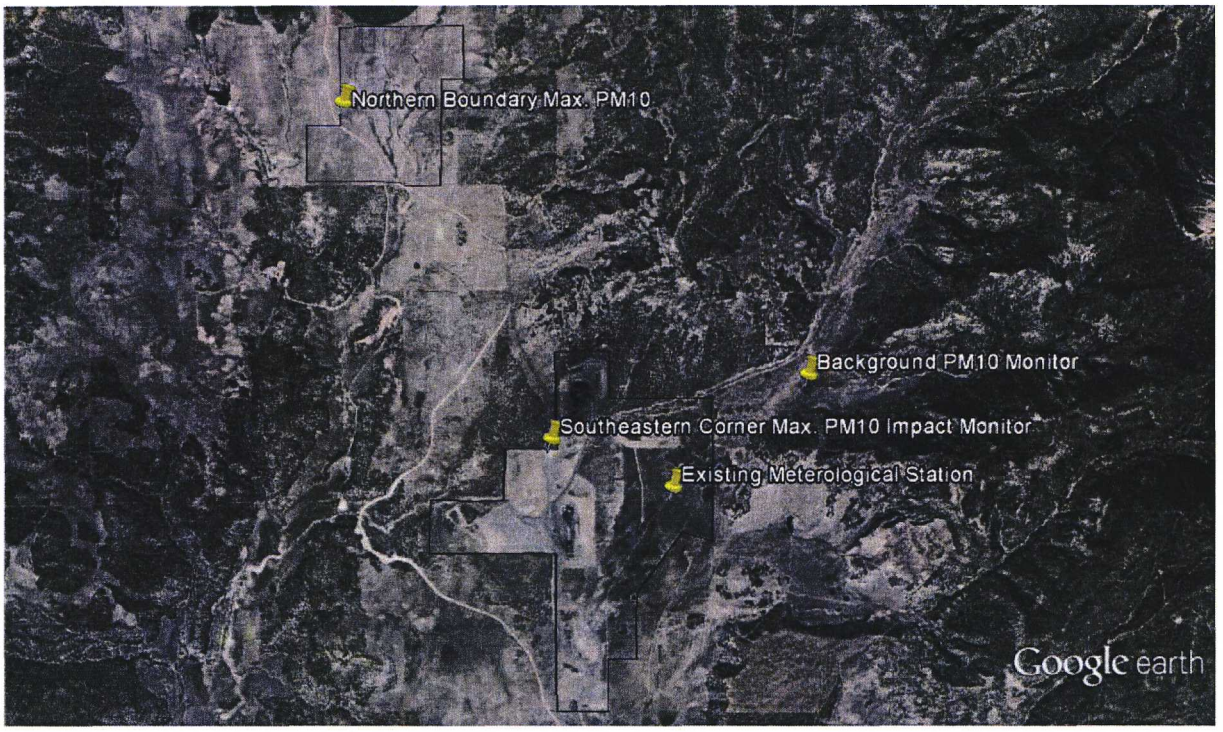


Figure 2 - Satellite View of Monitoring Locations



3.0 AIR QUALITY DATA SUMMARIES

A listing of the measured PM_{10} concentrations for the quarter are presented in Appendix B (individual data sheets are provided on the enclosed disk in the PDF version of Appendix B) and Field Data Sheets generated during the collection of each sample are presented in Appendix D. Measurements were collected during a 24-hour periods and represent the average PM_{10} concentration during the midnight to midnight data collection cycle. As required by the operating permit for the CHM, duplicate measurements were made with Sampler #963B (designated as a compliance monitor) and Sampler #964C (designated as a co-located sampler) to the extent possible. The quarterly mean PM_{10} concentration and the comparison of measured concentrations to standards are based on measurements from the primary Sampler #963B. If a measurement from Sampler #963B was missing or invalid, the measurement from the secondary Sampler #964C would be used. Also, required by the operating permit for the NPL, duplicate measurements were made with Sampler #2366D (designated as a compliance monitor) and Sampler #2398E (designated as a co-located sampler) to the extent possible. The quarterly mean PM_{10} concentration and the comparison of measured concentrations to standards are based on measurements from the primary Sampler #2366D. If a measurement from Sampler #2366D was missing or invalid, the measurement from the secondary Sampler #2398E would be used.

The highest 24-hour mean PM_{10} concentrations measured during the quarter from the three monitoring locations are summarized in Table I, Table II, Table III, Table IV and Table V. The three highest concentrations, # of valid samples, and the arithmetic mean concentrations from each of the sites are listed. All measured PM_{10} concentrations were below the 24-hour National Ambient Air Quality Standard (NAAQS) of 150 $\mu g/m^3$.

Table I - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Background Monitor - 962A

RANK	DATE	PM_{10} CONCENTRATION
Highest	10/03/2016	12.2
2nd Highest	10/15/2016	9.8
Monthly Mean	10/1/16-10/31/16	8.6
Monthly Mean	11/1/16-11/30/16	5.0
Monthly Mean	12/1/16-12/31/16	4.2
Quarterly Mean	10/1/16-12/31/16 (15 valid samples)	5.9

Table II - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Compliance Monitor - 963B

RANK	DATE	PM_{10} CONCENTRATION
Highest	11/14/2016	111.5
2nd Highest	12/20/2016	80.3
Monthly Mean	10/1/16-10/31/16	25.1
Monthly Mean	11/1/16-11/30/16	39.0
Monthly Mean	12/1/16-12/31/16	28.2
Quarterly Mean	10/1/16-12/31/16 (15 valid samples)	30.8

Table III - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Collocated Monitor – 964C

RANK	DATE	PM_{10} CONCENTRATION
Highest	11/14/2016	109.6
2nd Highest	12/20/2016	101.9
Monthly Mean	10/1/16-10/31/16	34.0
Monthly Mean	11/1/16-11/30/16	39.4
Monthly Mean	12/1/16-12/31/16	31.2
Quarterly Mean	10/1/16-12/31/16 (15 valid samples)	38.0

Table IV - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Compliance Monitor – 2366D

RANK	DATE	PM_{10} CONCENTRATION
Highest	10/21/2016	53.0
2nd Highest	10/03/2016	50.0
Monthly Mean	10/1/16-10/31/16	35.0
Monthly Mean	11/1/16-11/30/16	13.1
Monthly Mean	12/1/16-12/31/16	20.7
Quarterly Mean	10/1/16-12/31/16 (14 valid samples)	23.6

Table V - Summary of Measured PM_{10} Concentrations ($\mu g/m^3$)
Collocated Monitor – 2398E

RANK	DATE	PM_{10} CONCENTRATION
Highest	10/03/2016	61.5
2nd Highest	10/21/2016	56.7
Monthly Mean	10/1/16-10/31/16	39.7
Monthly Mean	11/1/16-11/30/16	11.0
Monthly Mean	12/1/16-12/31/16	18.6
Quarterly Mean	10/1/16-12/31/16 (15 valid samples)	23.1

Table VI – Mean Quarterly and Monthly Wind Speed

	4th Quarter 2016	Oct.	Nov.	Dec.
Mean Wind Speed (m/s)	2.66	2.96	2.98	2.03

4.0 DATA RECOVERY AND QUALITY ASSURANCE

4.1 Data Recovery

Monitor 962A

Monitor 962A collected 15 of the 15 samples during the quarter. The percent recovery for this quarter is 100%.

Monitor 963B

Monitor 963B collected 15 of the 15 samples during the quarter. The percent recovery for this quarter is 100%.

Monitor 964C

Monitor 964C collected 15 of the 15 samples during the quarter. The percent recovery for this quarter is 100%.

Monitor 2366D

Monitor 2366D collected 14 of the 15 samples during the quarter. The percent recovery for this quarter is 93%. For the sample date of Nov 2nd, the monitor timer information indicates that the stop time was inaccurately programed, the run was halted by the operator at 53 hrs. of run time.

Monitor 2398E

Monitor 2398E collected 15 of the 15 samples during the quarter. The percent recovery for this quarter is 100%.

The PM_{10} data recoveries for the five monitoring stations are presented below:

Table VIII - Summary of Data Recovery

SAMPLER	POSSIBLE SAMPLES	VALID SAMPLES	PERCENT DATA RECOVERY
962A	15	15	100%
963B	15	15	100%
964C	15	15	100%
2366D	15	14	93%
2398E	15	15	100%

4.2 Quality Assurance

Quality assurance procedures utilized to verify the integrity of the measured PM_{10} data included the following:

1. Review of PM_{10} precision measurements based upon duplicate, collocated measurements.

2. Independent quarterly audits of the PM_{10} samplers.

3. Monthly zero and single point flow rate checks of the PM_{10} samplers.

4.2.1 Precision of PM_{10} Measurements

The precision of the PM_{10} measurements was determined from the duplicate samples collected from the collocated BGI PQ200 Monitors 963B and 964C at the Coal Hollow Mine and 2366D and 2398E at the North Private Lease. As recommended in *40 CFR, Part 58*, Appendix A, Section 5.3.1, PM_{10} precision checks are reported for instances when the concentrations for duplicate samples both exceed 3 $\mu g/m^3$. Duplicate samples that did not meet this condition were omitted for the purposes of the precision checks. Appendix C, of this report summarizes precision calculations between the compliance monitor and the co-located monitor. Monthly flow rate verification data is also summarized in Appendix C.

Precision calculations at the Coal Hollow Mine were developed based on 14 valid pairs of co-located monitoring data during the quarter. Single point precision based on *40 CFR, Part 58*, Appendix A Equation 2 results were -59.8% to 16.4%. The aggregate coefficient of variability (CV) calculated in accordance with *40 CFR, Part 58*, Appendix A Equation 11 is 20.51%. This value is not within the 10% goal for aggregate CV.

Precision calculations at the North Private Lease were developed based on 13 valid pairs of co-located monitoring data during the quarter. Single point precision based on *40 CFR, Part 58*, Appendix A Equation 2 results were -24.2% to 32.4%. The aggregate coefficient of variability (CV) calculated in accordance with *40 CFR, Part 58*, Appendix A Equation 11 is 15.44%. This value is not within the 10% goal for aggregate CV.

4.2.2 Audit Results

The accuracy of the PM_{10} sampler flows was verified by a performance audit conducted by Air Resource Specialist on Nov. 9, 2016. A copy of the audit report is presented in Appendix E and is summarized in Table VI. The audit results indicate that the five samplers were operating properly.

Table VII III- Audit Summary

SAMPLER	AUDIT % DIFFERENCE	LIMIT*	DESIGN % DIFFERENCE	LIMIT*
962A	-1.5	±4%	1.5	± 5%

963B	0.1	±4%	-0.1	± 5%
964C	-0.5	±4%	0.5	± 5%
2366D	-0.3	±4%	0.3	± 5%
2398E	-0.4	±4%	0.4	± 5%
*Values between ± 7% and ± 10% require recalibration but no data are invalidated.				

4.2.3 Zero and Single Point Flow Rate Checks

Zero and single-point flow rate verifications are performed by a site technician on a monthly basis. The data was then input into a statistical calculator to calculate percent difference and bias between each of the monitors and the monthly single point flow rate measured by a NIST traceable calibration orifice. The calculator used is called the "Data Assessment Statistical Calculator" DASC Tool. DASC was developed for the data user community and can be found in the Precision and Accuracy Reporting System within the Quality Assurance section of EPA's Ambient Monitoring Technology Information System. This data is presented in Appendix C of this report.

APPENDIX A

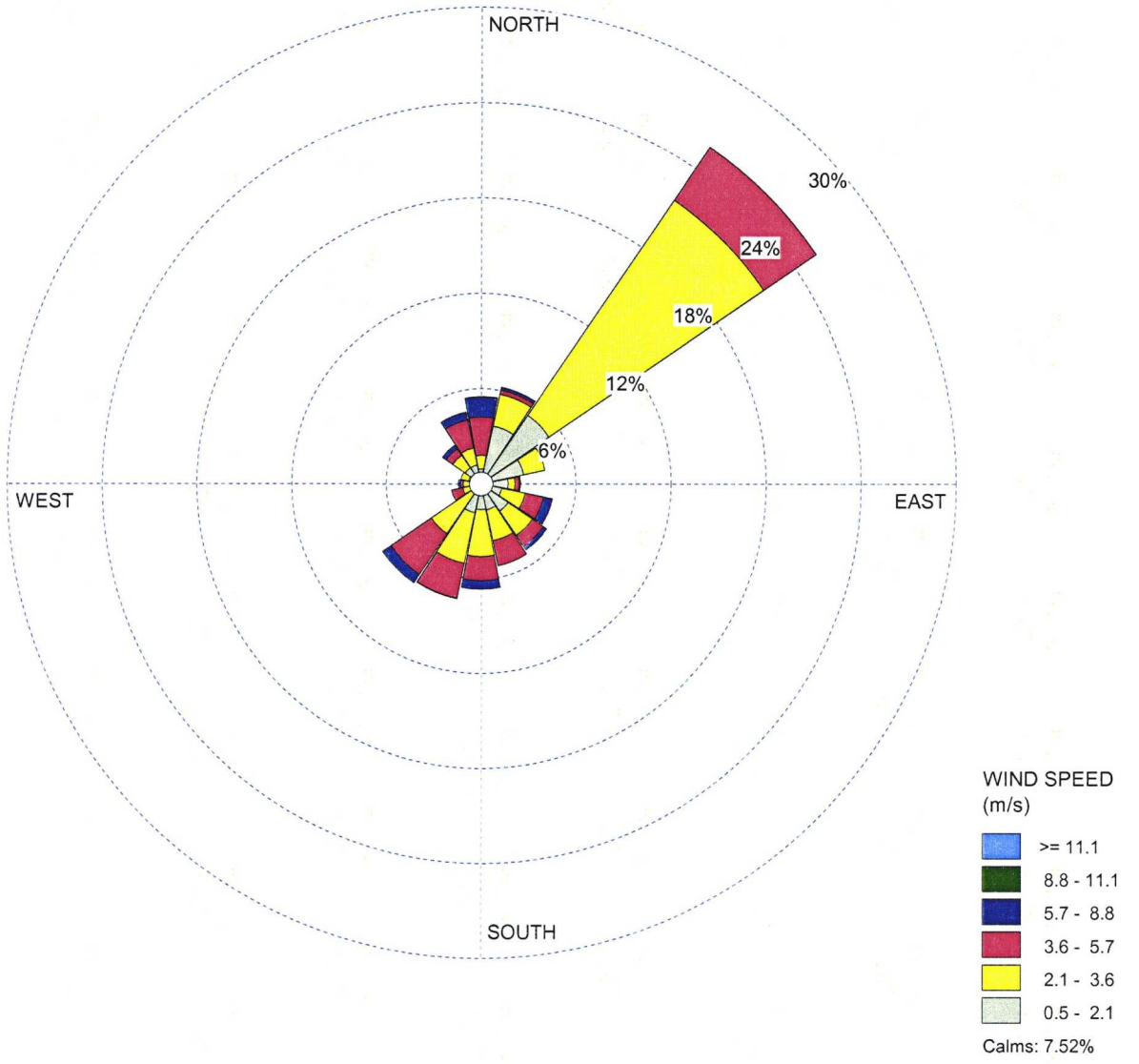
Windrose

WIND ROSE PLOT:

Alton Coal Development, LLC , Alton, Utah
2016 4th Quarter

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 10/1/2016 - 00:00** **End Date: 12/31/2016 - 23:00**	COMPANY NAME: **Alton Coal Development, LLC - Coal Hollow Mine**	
		MODELER: **B. Kirk Nicholes**	
	CALM WINDS: **7.52%**	TOTAL COUNT: **2208 hrs.**	
	AVG. WIND SPEED: **2.66 m/s**	DATE: **1/9/2017**	PROJECT NO.:

Station ID: 1 Run ID:
Start Date: 10/1/2016 - 00:00
End Date: 12/31/2016 - 23:00

Frequency Distribution
(Count)

Wind Direction (Blowing From) / Wind Speed (m/s)

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	21	19	53	28	0	0	121
11.25-33.75	82	45	6	4	0	0	137
33.75-56.25	115	361	88	0	0	0	564
56.25-78.75	61	30	0	0	0	0	91
78.75-101.25	38	9	6	2	0	0	55
101.25-123.75	30	33	26	13	0	0	102
123.75-146.25	46	41	18	6	0	0	111
146.25-168.75	37	44	35	0	0	0	116
168.75-191.25	36	65	33	12	0	0	146
191.25-213.75	41	72	49	1	0	0	163
213.75-236.25	17	67	68	14	0	0	166
236.25-258.75	15	11	16	0	0	0	42
258.75-281.25	14	11	4	3	0	0	32
281.25-303.75	18	11	0	0	0	0	29
303.75-326.25	27	21	11	6	0	0	65
326.25-348.75	27	24	40	11	0	0	102
Total	625	864	453	100	0	0	2208

Frequency of Calm Winds: 166
Average Wind Speed: 2.66 m/s

Station ID: 1 Run ID:
Start Date: 10/1/2016 - 00:00
End Date: 12/31/2016 - 23:00

Frequency Distribution
(Normalized)

Wind Direction (Blowing From) / Wind Speed (m/s)

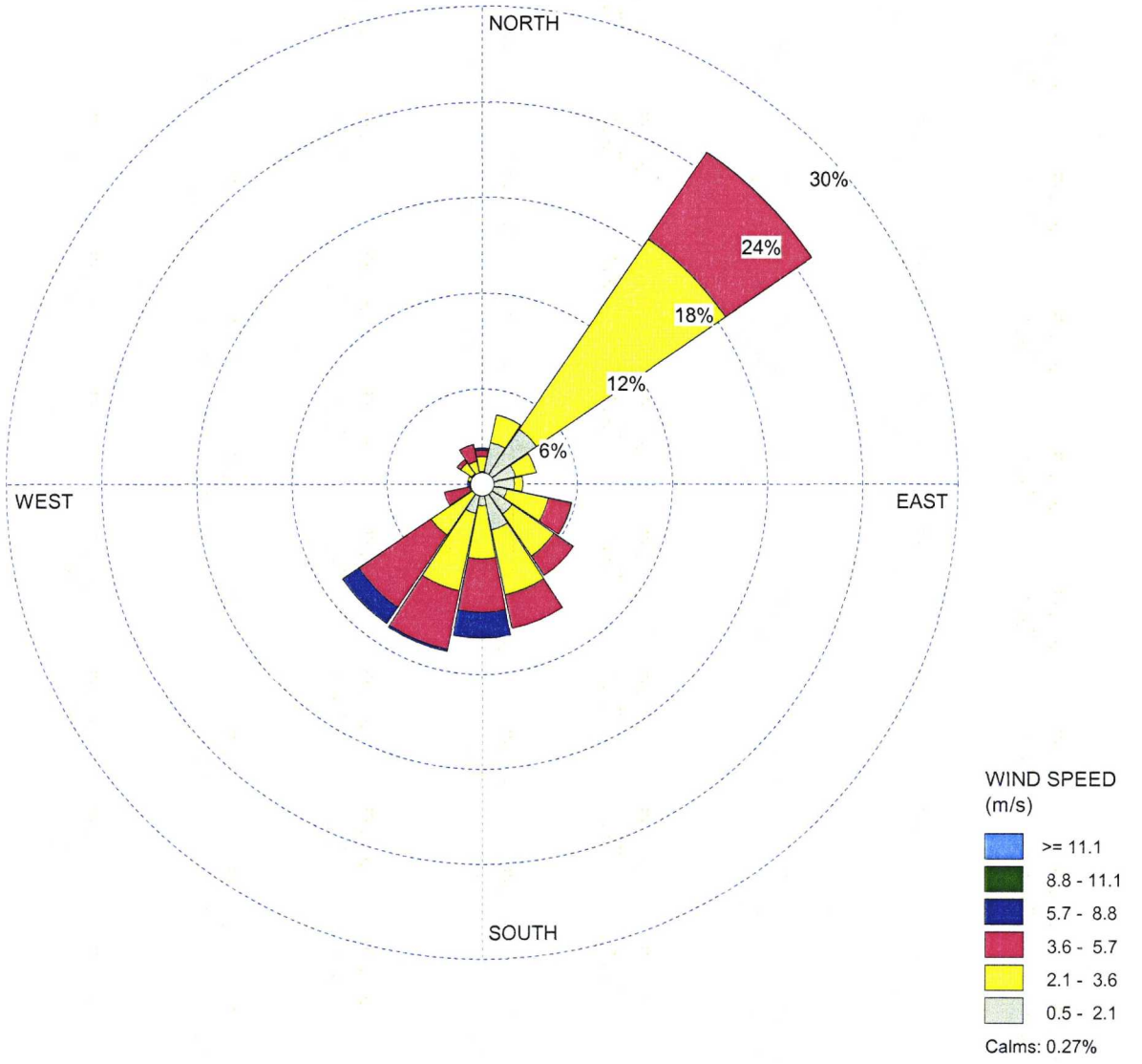
	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	0.009511	0.008605	0.024004	0.012681	0.000000	0.000000	0.054801
11.25-33.75	0.037138	0.020380	0.002717	0.001812	0.000000	0.000000	0.062047
33.75-56.25	0.052083	0.163496	0.039855	0.000000	0.000000	0.000000	0.255435
56.25-78.75	0.027627	0.013587	0.000000	0.000000	0.000000	0.000000	0.041214
78.75-101.25	0.017210	0.004076	0.002717	0.000906	0.000000	0.000000	0.024909
101.25-123.75	0.013587	0.014946	0.011775	0.005888	0.000000	0.000000	0.046196
123.75-146.25	0.020833	0.018569	0.008152	0.002717	0.000000	0.000000	0.050272
146.25-168.75	0.016757	0.019928	0.015851	0.000000	0.000000	0.000000	0.052536
168.75-191.25	0.016304	0.029438	0.014946	0.005435	0.000000	0.000000	0.066123
191.25-213.75	0.018569	0.032609	0.022192	0.000453	0.000000	0.000000	0.073822
213.75-236.25	0.007699	0.030344	0.030797	0.006341	0.000000	0.000000	0.075181
236.25-258.75	0.006793	0.004982	0.007246	0.000000	0.000000	0.000000	0.019022
258.75-281.25	0.006341	0.004982	0.001812	0.001359	0.000000	0.000000	0.014493
281.25-303.75	0.008152	0.004982	0.000000	0.000000	0.000000	0.000000	0.013134
303.75-326.25	0.012228	0.009511	0.004982	0.002717	0.000000	0.000000	0.029438
326.25-348.75	0.012228	0.010870	0.018116	0.004982	0.000000	0.000000	0.046196
Total	0.283062	0.391304	0.205163	0.045290	0.000000	0.000000	0.924819

Frequency of Calm Winds: 7.52%
Average Wind Speed: 2.66 m/s

WIND ROSE PLOT:

Alton Coal Development, LLC , Alton, Utah
2016 October

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 10/1/2016 - 00:00 **End Date: 10/31/2016 - 23:00**	**Alton Coal Development, LLC - Coal Hollow Mine**	
		MODELER: **B. Kirk Nicholes**	
	CALM WINDS: **0.27%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **2.96 m/s**	DATE: **1/9/2017**	PROJECT NO.:

Station ID: 1 Run ID:
Start Date: 10/1/2016 - 00:00
End Date: 10/31/2016 - 23:00

Frequency Distribution
(Count)

Wind Direction (Blowing From) / Wind Speed (m/s)

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	6	7	3	1	0	0	17
11.25-33.75	20	13	0	0	0	0	33
33.75-56.25	31	107	49	0	0	0	187
56.25-78.75	16	10	0	0	0	0	26
78.75-101.25	15	4	0	0	0	0	19
101.25-123.75	12	20	11	0	0	0	43
123.75-146.25	17	24	11	0	0	0	52
146.25-168.75	22	31	16	0	0	0	69
168.75-191.25	10	25	25	12	0	0	72
191.25-213.75	14	37	28	1	0	0	80
213.75-236.25	1	28	41	9	0	0	79
236.25-258.75	2	4	12	0	0	0	18
258.75-281.25	3	1	0	3	0	0	7
281.25-303.75	5	2	0	0	0	0	7
303.75-326.25	6	6	2	0	0	0	14
326.25-348.75	5	6	8	0	0	0	19
Total	185	325	206	26	0	0	744

Frequency of Calm Winds: 2
Average Wind Speed: 2.96 m/s

Station ID: 1 Run ID:
Start Date: 10/1/2016 - 00:00
End Date: 10/31/2016 - 23:00

Frequency Distribution
(Normalized)

Wind Direction (Blowing From) / Wind Speed (m/s)

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	0.008065	0.009409	0.004032	0.001344	0.000000	0.000000	0.022849
11.25-33.75	0.026882	0.017473	0.000000	0.000000	0.000000	0.000000	0.044355
33.75-56.25	0.041667	0.143817	0.065860	0.000000	0.000000	0.000000	0.251344
56.25-78.75	0.021505	0.013441	0.000000	0.000000	0.000000	0.000000	0.034946
78.75-101.25	0.020161	0.005376	0.000000	0.000000	0.000000	0.000000	0.025538
101.25-123.75	0.016129	0.026882	0.014785	0.000000	0.000000	0.000000	0.057796
123.75-146.25	0.022849	0.032258	0.014785	0.000000	0.000000	0.000000	0.069892
146.25-168.75	0.029570	0.041667	0.021505	0.000000	0.000000	0.000000	0.092742
168.75-191.25	0.013441	0.033602	0.033602	0.016129	0.000000	0.000000	0.096774
191.25-213.75	0.018817	0.049731	0.037634	0.001344	0.000000	0.000000	0.107527
213.75-236.25	0.001344	0.037634	0.055108	0.012097	0.000000	0.000000	0.106183
236.25-258.75	0.002688	0.005376	0.016129	0.000000	0.000000	0.000000	0.024194
258.75-281.25	0.004032	0.001344	0.000000	0.004032	0.000000	0.000000	0.009409
281.25-303.75	0.006720	0.002688	0.000000	0.000000	0.000000	0.000000	0.009409
303.75-326.25	0.008065	0.008065	0.002688	0.000000	0.000000	0.000000	0.018817
326.25-348.75	0.006720	0.008065	0.010753	0.000000	0.000000	0.000000	0.025538
Total	0.248656	0.436828	0.276882	0.034946	0.000000	0.000000	0.997312

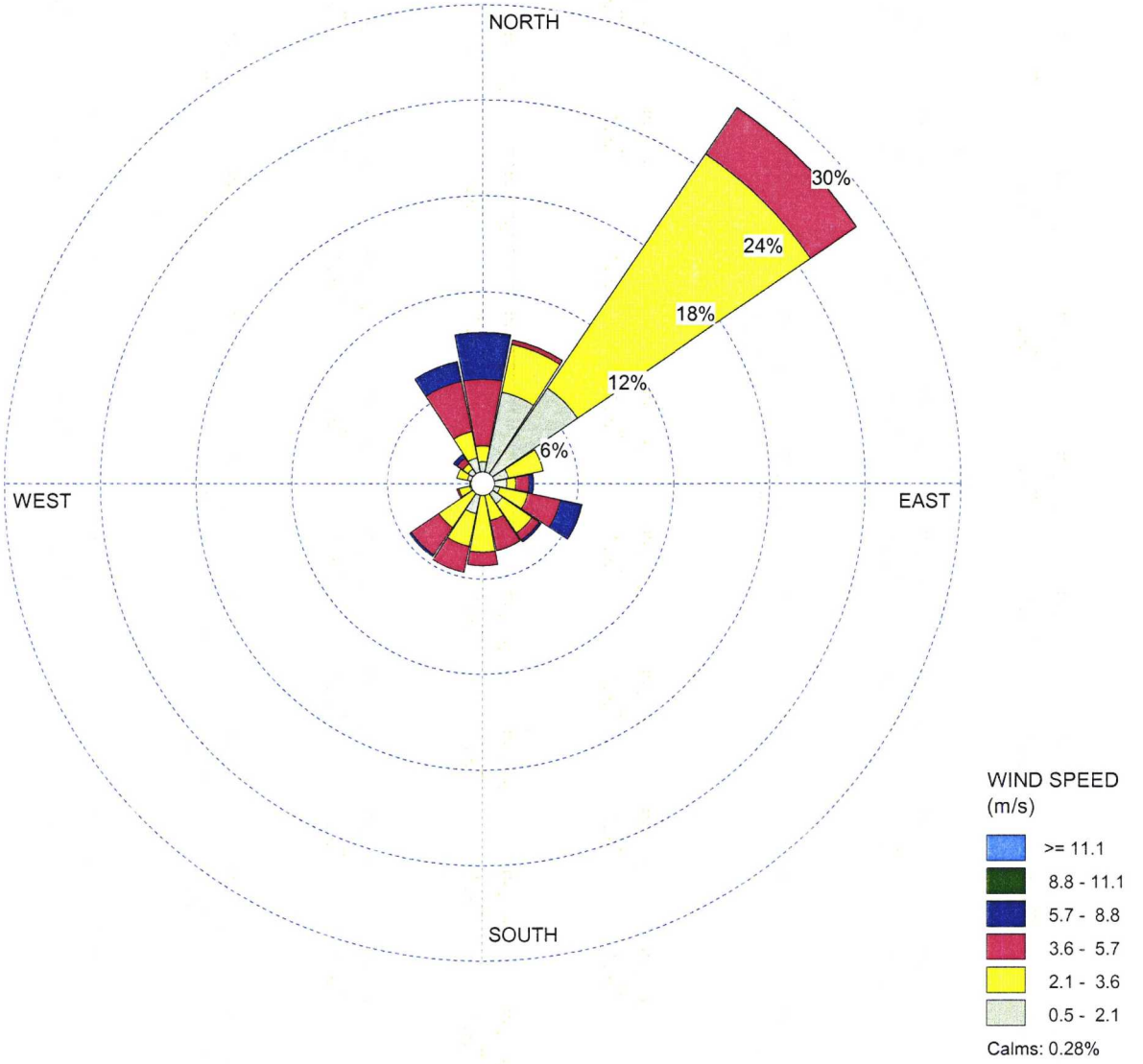
Frequency of Calm Winds: 0.27%
Average Wind Speed: 2.96 m/s

WIND ROSE PLOT:

Alton Coal Development, LLC , Alton, Utah
2016 November

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 11/1/2016 - 00:00** **End Date: 11/30/2016 - 23:00**	COMPANY NAME: **Alton Coal Development, LLC - Coal Hollow Mine**	
		MODELER: **B. Kirk Nicholes**	
	CALM WINDS: **0.28%**	TOTAL COUNT: **720 hrs.**	
	AVG. WIND SPEED: **2.98 m/s**	DATE: **1/9/2017**	PROJECT NO.:

Station ID: 1 Run ID:
Start Date: 11/1/2016 - 00:00
End Date: 11/30/2016 - 23:00

Frequency Distribution
(Count)

Wind Direction (Blowing From) / Wind Speed (m/s)

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	10	7	30	21	0	0	68
11.25-33.75	42	22	2	0	0	0	66
33.75-56.25	52	127	25	0	0	0	204
56.25-78.75	12	16	0	0	0	0	28
78.75-101.25	11	4	6	2	0	0	23
101.25-123.75	8	13	15	10	0	0	46
123.75-146.25	11	16	4	1	0	0	32
146.25-168.75	5	12	14	0	0	0	31
168.75-191.25	5	26	6	0	0	0	37
191.25-213.75	14	15	12	0	0	0	41
213.75-236.25	3	21	15	1	0	0	40
236.25-258.75	6	5	1	0	0	0	12
258.75-281.25	4	2	0	0	0	0	6
281.25-303.75	7	5	0	0	0	0	12
303.75-326.25	8	3	3	2	0	0	16
326.25-348.75	12	12	23	9	0	0	56
Total	210	306	156	46	0	0	720

Frequency of Calm Winds: 2
Average Wind Speed: 2.98 m/s

Station ID: 1 Run ID:
Start Date: 11/1/2016 - 00:00
End Date: 11/30/2016 - 23:00

Frequency Distribution
(Normalized)

Wind Direction (Blowing From) / Wind Speed (m/s)

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	0.013889	0.009722	0.041667	0.029167	0.000000	0.000000	0.094444
11.25-33.75	0.058333	0.030556	0.002778	0.000000	0.000000	0.000000	0.091667
33.75-56.25	0.072222	0.176389	0.034722	0.000000	0.000000	0.000000	0.283333
56.25-78.75	0.016667	0.022222	0.000000	0.000000	0.000000	0.000000	0.038889
78.75-101.25	0.015278	0.005556	0.008333	0.002778	0.000000	0.000000	0.031944
101.25-123.75	0.011111	0.018056	0.020833	0.013889	0.000000	0.000000	0.063889
123.75-146.25	0.015278	0.022222	0.005556	0.001389	0.000000	0.000000	0.044444
146.25-168.75	0.006944	0.016667	0.019444	0.000000	0.000000	0.000000	0.043056
168.75-191.25	0.006944	0.036111	0.008333	0.000000	0.000000	0.000000	0.051389
191.25-213.75	0.019444	0.020833	0.016667	0.000000	0.000000	0.000000	0.056944
213.75-236.25	0.004167	0.029167	0.020833	0.001389	0.000000	0.000000	0.055556
236.25-258.75	0.008333	0.006944	0.001389	0.000000	0.000000	0.000000	0.016667
258.75-281.25	0.005556	0.002778	0.000000	0.000000	0.000000	0.000000	0.008333
281.25-303.75	0.009722	0.006944	0.000000	0.000000	0.000000	0.000000	0.016667
303.75-326.25	0.011111	0.004167	0.004167	0.002778	0.000000	0.000000	0.022222
326.25-348.75	0.016667	0.016667	0.031944	0.012500	0.000000	0.000000	0.077778
Total	0.291667	0.425000	0.216667	0.063889	0.000000	0.000000	0.997222

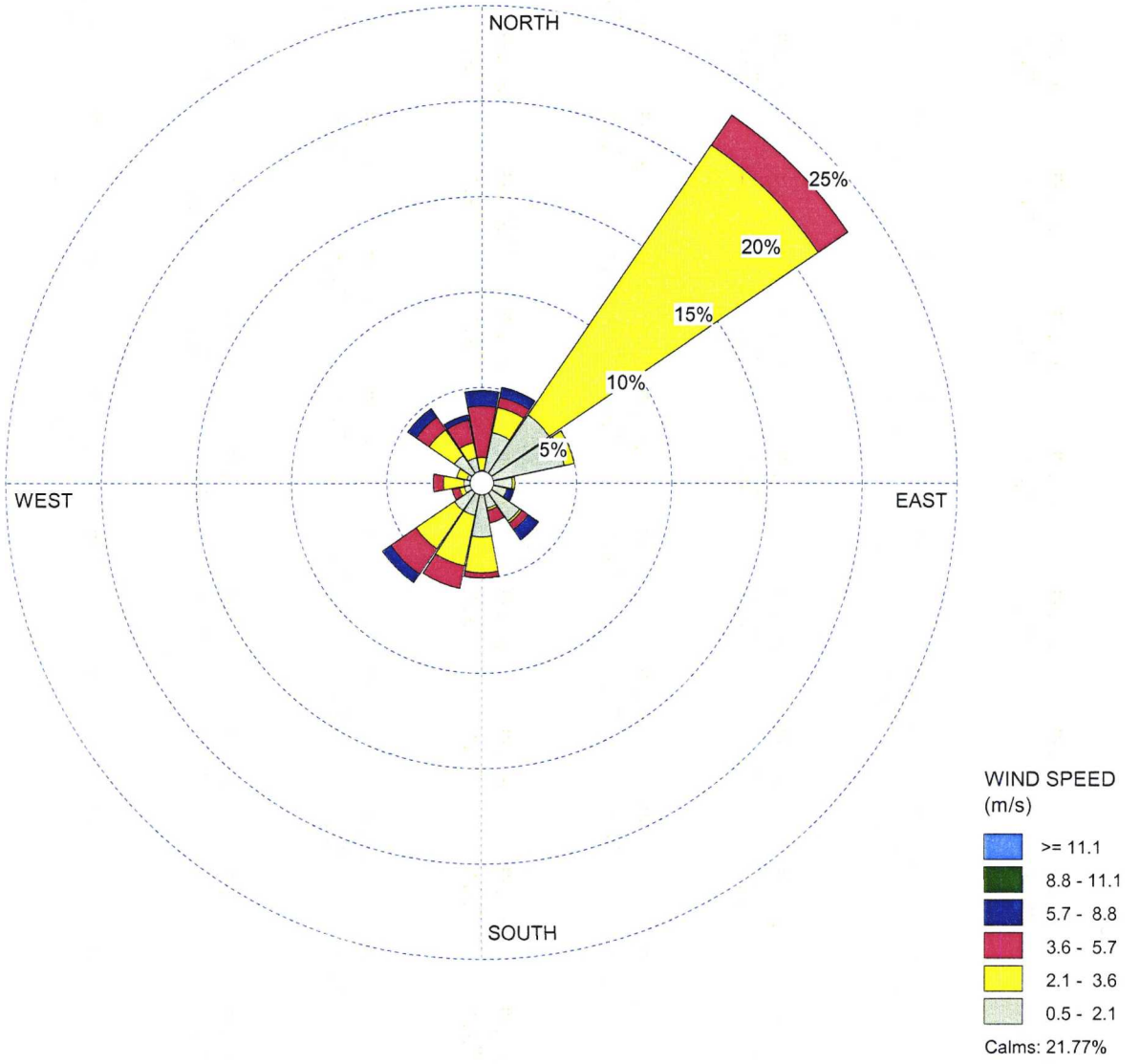
Frequency of Calm Winds: 0.28%
Average Wind Speed: 2.98 m/s

WIND ROSE PLOT:

Alton Coal Development, LLC , Alton, Utah
2016 December

DISPLAY:

Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD: **Start Date: 12/1/2016 - 00:00** **End Date: 12/31/2016 - 23:00**	COMPANY NAME: **Alton Coal Development, LLC - Coal Hollow Mine**	
		MODELER: **B. Kirk Nicholes**	
	CALM WINDS: **21.77%**	TOTAL COUNT: **744 hrs.**	
	AVG. WIND SPEED: **2.03 m/s**	DATE: **1/9/2017**	PROJECT NO.:

Station ID: 1 Run ID:
Start Date: 12/1/2016 - 00:00
End Date: 12/31/2016 - 23:00

Frequency Distribution
(Count)

Wind Direction (Blowing From) / Wind Speed (m/s)

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	5	5	20	6	0	0	36
11.25-33.75	20	10	4	4	0	0	38
33.75-56.25	32	127	14	0	0	0	173
56.25-78.75	33	4	0	0	0	0	37
78.75-101.25	12	1	0	0	0	0	13
101.25-123.75	10	0	0	3	0	0	13
123.75-146.25	18	1	3	5	0	0	27
146.25-168.75	10	1	5	0	0	0	16
168.75-191.25	21	14	2	0	0	0	37
191.25-213.75	13	20	9	0	0	0	42
213.75-236.25	13	18	12	4	0	0	47
236.25-258.75	7	2	3	0	0	0	12
258.75-281.25	7	8	4	0	0	0	19
281.25-303.75	6	4	0	0	0	0	10
303.75-326.25	13	12	6	4	0	0	35
326.25-348.75	10	6	9	2	0	0	27
Total	230	233	91	28	0	0	744

Frequency of Calm Winds: 162
Average Wind Speed: 2.03 m/s

Station ID: 1 Run ID:
Start Date: 12/1/2016 - 00:00
End Date: 12/31/2016 - 23:00

Frequency Distribution
(Normalized)

Wind Direction (Blowing From) / Wind Speed (m/s)

	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
348.75-11.25	0.006720	0.006720	0.026882	0.008065	0.000000	0.000000	0.048387
11.25-33.75	0.026882	0.013441	0.005376	0.005376	0.000000	0.000000	0.051075
33.75-56.25	0.043011	0.170699	0.018817	0.000000	0.000000	0.000000	0.232527
56.25-78.75	0.044355	0.005376	0.000000	0.000000	0.000000	0.000000	0.049731
78.75-101.25	0.016129	0.001344	0.000000	0.000000	0.000000	0.000000	0.017473
101.25-123.75	0.013441	0.000000	0.000000	0.004032	0.000000	0.000000	0.017473
123.75-146.25	0.024194	0.001344	0.004032	0.006720	0.000000	0.000000	0.036290
146.25-168.75	0.013441	0.001344	0.006720	0.000000	0.000000	0.000000	0.021505
168.75-191.25	0.028226	0.018817	0.002688	0.000000	0.000000	0.000000	0.049731
191.25-213.75	0.017473	0.026882	0.012097	0.000000	0.000000	0.000000	0.056452
213.75-236.25	0.017473	0.024194	0.016129	0.005376	0.000000	0.000000	0.063172
236.25-258.75	0.009409	0.002688	0.004032	0.000000	0.000000	0.000000	0.016129
258.75-281.25	0.009409	0.010753	0.005376	0.000000	0.000000	0.000000	0.025538
281.25-303.75	0.008065	0.005376	0.000000	0.000000	0.000000	0.000000	0.013441
303.75-326.25	0.017473	0.016129	0.008065	0.005376	0.000000	0.000000	0.047043
326.25-348.75	0.013441	0.008065	0.012097	0.002688	0.000000	0.000000	0.036290
Total	0.309140	0.313172	0.122312	0.037634	0.000000	0.000000	0.782258

Frequency of Calm Winds: 21.77%
Average Wind Speed: 2.03 m/s

APPENDIX B

Listing of PM_{10} Concentrations

Individual Data Sheets provided on CD

Background Monitor 962A

PM_{10} Sampler Summary

October 1, 2016 - December 31, 2016

Network: **Alton Coal Development**
Site: Coal Hollow
Sampler ID: Coal Hollow-A **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Mass Tare (mg)	Mass Gross (mg)	Mass Net (mg)	Flag	Comments
10/03/16	P2933162	**10.0**	**12.2**	23:59	24.0	19.6	369.748	369.989	0.241		
10/09/16	P2933513	**6.2**	**7.7**	24:00	24.0	19.5	382.312	382.463	0.151		
10/15/16	P2933523	**7.8**	**9.8**	23:59	24.0	19.2	378.220	378.408	0.188		
10/21/16	P2933829	**5.5**	**6.8**	23:59	24.0	19.6	387.875	388.008	0.133		
10/27/16	P2933518	**5.2**	**6.6**	23:59	24.0	19.2	390.837	390.964	0.127	XT	
11/02/16	P2933830	**3.2**	**3.8**	23:59	24.0	19.8	374.041	374.118	0.077	HT	
11/08/16	P2933835	**3.6**	**4.4**	23:59	24.0	19.8	380.794	380.882	0.088		
11/14/16	P2934147	**5.0**	**6.1**	23:59	24.0	19.8	384.306	384.428	0.122		
11/20/16	P2934428	**4.7**	**5.7**	23:59	24.0	19.6	379.950	380.063	0.113		
11/26/16	P2934433	**4.3**	**5.2**	23:59	24.0	19.9	375.840	375.945	0.105		
12/02/16	P2934438	**3.7**	**4.4**	23:59	24.0	20.4	378.436	378.526	0.090		
12/08/16	P2934772	**7.1**	**8.4**	23:59	24.0	20.4	391.553	391.726	0.173		
12/14/16	P2934773	**1.7**	**2.1**	24:00	24.0	20.0	382.432	382.475	0.043		
12/20/16	P2935091	**3.7**	**4.4**	23:59	24.0	20.4	381.251	381.341	0.090		
12/26/16	P2935096	**1.4**	**1.6**	23:59	24.0	21.1	383.239	383.274	0.035	TD	
11/04/16	P2934146		**Field Blank**				385.463	385.474	0.011		

# Valid	Recovery	Average	St. Dev.	Max	Min
15	**100%**	**5.9**	**2.8**	**12.2**	**1.6**

Compliance Monitor 963B

PM_{10} Sampler Summary

October 1, 2016 - December 31, 2016

Network: **Alton Coal Development**
Site: Coal Hollow
Sampler ID: Coal Hollow-B **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Tare (mg)	Mass Gross (mg)	Net (mg)	Flag	Comments
10/03/16	P2933164	**16.6**	**20.2**	23:59	24.0	19.8	373.655	374.056	0.401		
10/09/16	P2933514	**6.6**	**8.1**	24:00	24.0	19.7	375.880	376.040	0.160		
10/15/16	P2933524	**6.4**	**8.0**	23:59	24.0	19.3	379.486	379.641	0.155		
10/21/16	P2933827	**46.7**	**56.7**	23:59	24.0	19.8	383.659	384.783	1.124		Smudged; discoloration
10/27/16	P2933519	**26.6**	**32.6**	23:59	24.0	19.7	388.245	388.886	0.641	XT	
11/02/16	P2933831	**15.3**	**18.4**	23:59	24.0	20.0	385.662	386.031	0.369	HT	
11/08/16	P2934142	**44.5**	**53.5**	23:59	24.0	20.0	389.341	390.412	1.071		
11/14/16	P2934149	**92.6**	**111.5**	23:59	24.0	20.0	391.473	393.699	2.226		
11/20/16	P2934429	**5.5**	**6.6**	23:59	24.0	19.9	385.179	385.312	0.133		
11/26/16	P2934434	**4.4**	**5.2**	23:59	24.0	20.2	378.095	378.202	0.107		
12/02/16	P2934439	**18.1**	**21.1**	23:59	24.0	20.6	374.876	375.312	0.436		Lighter color
12/08/16	P2934778	**25.6**	**29.9**	23:59	24.0	20.6	374.649	375.266	0.617		Discoloration
12/14/16	P2934783	**5.2**	**6.2**	23:59	24.0	20.2	385.377	385.504	0.127		
12/20/16	P2935092	**69.0**	**80.3**	23:59	24.0	20.7	390.654	392.314	1.660		Smudges
12/26/16	P2935097	**3.3**	**3.7**	23:59	24.0	21.4	384.978	385.059	0.081	PI	

# Valid	Recovery	Average	St. Dev.	Max	Min
15	**100%**	**30.8**	**31.8**	**111.5**	**3.7**

Collocated Monitor 964C

PM_{10} Sampler Summary

October 1, 2016 - December 31, 2016

Network: Alton Coal Development
Site: Coal Hollow
Sampler ID: Coal Hollow-C **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Mass Tare (mg)	Mass Gross (mg)	Mass Net (mg)	Flag	Comments
10/03/16	P2933165	**18.0**	**21.9**	23:59	24.0	19.8	365.099	365.534	0.435		
10/09/16	P2933515	**6.5**	**8.0**	24:00	24.0	19.7	389.034	389.192	0.158		
10/15/16	P2933525	**9.0**	**11.2**	23:59	24.0	19.4	385.936	386.154	0.218		
10/21/16	P2933828	**78.4**	**94.9**	23:59	24.0	19.9	385.604	387.491	1.887		Smudged; discoloration
10/27/16	P2933520	**28.0**	**34.1**	23:59	24.0	19.7	379.666	380.340	0.674	XT	
11/02/16	P2933832	**19.5**	**23.4**	23:59	24.0	20.0	380.241	380.710	0.469	HT	
11/08/16	P2934143	**43.2**	**51.8**	23:59	24.0	20.0	386.573	387.612	1.039		
11/14/16	P2934148	**91.3**	**109.6**	23:59	24.0	20.0	372.675	374.869	2.194		
11/20/16	P2934430	**4.7**	**5.6**	23:59	24.0	20.0	384.949	385.063	0.114		
11/26/16	P2934435	**5.6**	**6.7**	23:59	24.0	20.3	376.199	376.335	0.136		
12/02/16	P2934440	**33.6**	**39.1**	23:59	24.0	20.7	377.573	378.383	0.810		Discoloration; darker
12/08/16	P2934780	**33.0**	**38.4**	23:59	24.0	20.7	373.670	374.465	0.795		Discoloration
12/14/16	P2934774	**6.7**	**8.0**	23:59	24.0	20.2	381.406	381.569	0.163		
12/20/16	P2935093	**87.8**	**101.9**	23:59	24.0	20.7	375.324	377.436	2.112		Smudged; loose particles
12/26/16	P2935098	**2.5**	**2.8**	23:59	24.0	21.5	381.329	381.390	0.061		
11/09/16	P2933824		**Field Blank**				378.594	378.602	0.008		
12/05/16	P2934779		**Field Blank**				381.590	381.599	0.009		

# Valid	Recovery	Average	St. Dev.	Max	Min
15	**100%**	**37.2**	**36.7**	**109.6**	**2.8**

Compliance Monitor 2366D

PM_{10} Sampler Summary

October 1, 2016 - December 31, 2016

Network: **Alton Coal Development**
Site: Coal Hollow
Sampler ID: Coal Hollow-D **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Mass Tare (mg)	Mass Gross (mg)	Mass Net (mg)	Flag	Comments
10/03/16	P2933166	**41.1**	**50.0**	23:59	24.0	19.8	368.570	369.560	0.990		
10/09/16	P2933516	**6.8**	**8.3**	24:00	24.0	19.7	380.858	381.023	0.165		
10/15/16	P2933526	**27.2**	**33.8**	23:59	24.0	19.3	381.564	382.218	0.654		
10/21/16	P2933825	**43.5**	**53.0**	23:59	24.0	19.8	383.675	384.722	1.047		
10/27/16	P2933521	**24.5**	**29.9**	23:59	24.0	19.7	377.400	377.991	0.591	XT	
11/02/16	P2933833	**Invalid - AG**	**Invalid - AG**	57:34	57.7	47.9	380.530	380.882	0.352	SP,CI,HT	
11/08/16	P2934144	**13.6**	**16.4**	23:59	24.0	20.0	391.246	391.575	0.329		
11/14/16	P2934150	**18.6**	**22.4**	23:59	24.0	19.9	381.324	381.771	0.447		
11/20/16	P2934431	**6.2**	**7.5**	23:59	24.0	20.0	390.857	391.007	0.150		
11/26/16	P2934436	**5.0**	**6.0**	23:59	24.0	20.2	369.731	369.853	0.122		
12/02/16	P2934441	**4.5**	**5.2**	23:59	24.0	20.7	381.103	381.212	0.109		
12/08/16	P2934781	**22.5**	**26.2**	23:59	24.0	20.6	380.576	381.118	0.542		Darker color
12/14/16	P2934775	**25.3**	**30.0**	23:59	24.0	20.2	374.763	375.372	0.609	PI	
12/20/16	P2935094	**34.8**	**40.6**	23:59	24.0	20.6	385.229	386.066	0.837		
12/26/16	P2935100	**1.4**	**1.6**	23:59	24.0	21.5	379.340	379.375	0.035	PI,TD	
12/22/16	P2935099		**Field Blank**				384.479	384.513	0.034	FBout	Dark hair

# Valid	Recovery	Average	St. Dev.	Max	Min
14	**93%**	**23.6**	**16.9**	**53.0**	**1.6**

Collocated Monitor 2398E

PM_{10} Sampler Summary

October 1, 2016 - December 31, 2016

Network: **Alton Coal Development**
Site: Coal Hollow
Sampler ID: Coal Hollow-E **AQS ID:**
Sampler Type: BGI FRM Single

Date	Filter ID	Concentration (µg/m3) LTP	Concentration (µg/m3) STP	Sample Period (hr:min)	Sample Volume (m3)	Std Volume (m3)	Mass Tare (mg)	Mass Gross (mg)	Mass Net (mg)	Flag	Comments
10/03/16	P2933167	**50.6**	**61.5**	23:59	24.0	19.8	364.482	365.700	1.218		
10/09/16	P2933517	**7.3**	**9.0**	24:00	24.0	19.6	381.201	381.378	0.177		
10/15/16	P2933527	**34.6**	**43.1**	23:59	24.0	19.3	378.992	379.825	0.833		
10/21/16	P2933826	**46.6**	**56.7**	23:59	24.0	19.8	378.726	379.848	1.122		
10/27/16	P2933522	**23.3**	**28.4**	23:59	24.0	19.7	376.622	377.184	0.562	XT	
11/02/16	P2933834	**5.1**	**6.2**	23:59	24.0	20.0	382.533	382.657	0.124	HT	
11/08/16	P2934145	**12.1**	**14.5**	23:59	24.0	20.0	384.806	385.097	0.291		
11/14/16	P2934151	**17.7**	**21.4**	23:59	24.0	19.9	382.999	383.426	0.427		
11/20/16	P2934432	**6.2**	**7.5**	23:59	24.0	20.0	379.386	379.536	0.150		
11/26/16	P2934437	**4.5**	**5.4**	23:59	24.0	20.1	381.107	381.217	0.110		
12/02/16	P2934442	**5.5**	**6.4**	23:59	24.0	20.6	379.188	379.321	0.133		
12/08/16	P2934782	**16.1**	**18.9**	23:59	24.0	20.6	377.924	378.313	0.389		Lighter color
12/14/16	P2934776	**24.4**	**29.0**	23:59	24.0	20.2	381.341	381.928	0.587	PI	
12/20/16	P2935095	**31.7**	**37.0**	23:59	24.0	20.6	383.937	384.700	0.763		
12/26/16	P2935101	**1.3**	**1.5**	23:59	24.0	21.4	378.041	378.074	0.033		
12/05/16	P2934777		**Field Blank**				376.619	376.625	0.006		

# Valid	Recovery	Average	St. Dev.	Max	Min
15	**100%**	**23.1**	**19.2**	**61.5**	**1.5**

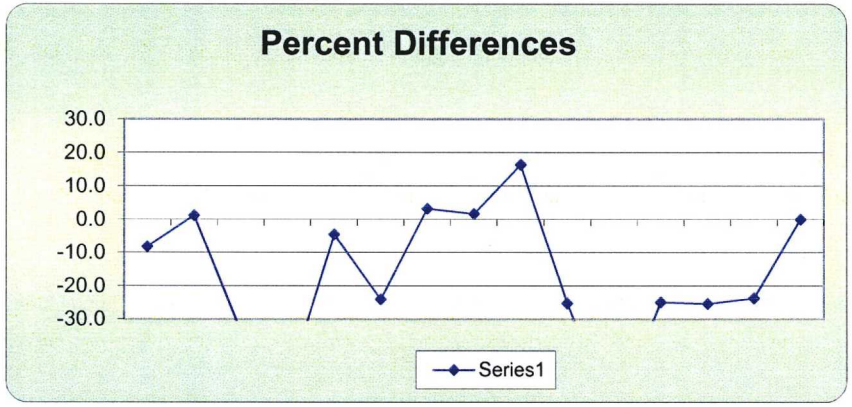
APPENDIX C

Precision and Single-Point Flow Rate Checks

Alton Coal Development, LLC - Coal Hollow Mine

Precision Estimate (From Collocated Samples)

Monitors 963B & 964C		Pollutant type:					CV_{ub} (%)		
Meas Val (Y)	**Audit Val (X)**	**d (Eqn 10)**	**25th Percentile**	**d^2**	**$\|d\|$**	**$\|d\|^2$**			
20.2	21.9	-8.1	-25.317	65.222	8.076	65.222			
8.1	8	1.2	**75th Percentile**	1.543	1.242	1.543	**n**	**$\Sigma\|d\|$**	**$\Sigma\|d\|^2$**
8	11.2	-33.3	-0.193	1111.111	33.333	1111.111	14	301.773	10628.389
56.7	94.9	-50.4		2539.734	50.396	2539.734	**n-1**	**Σd**	**Σd^2**
32.6	34.1	-4.5		20.230	4.498	20.230	13	-256.606	10628.389
18.4	23.4	-23.9		572.331	23.923	572.331			
53.5	51.8	3.2		10.426	3.229	10.426			
111.5	109.6	1.7		2.953859	1.719	2.954			
6.6	5.6	16.4		268.745	16.393	268.745	**CV (%) (Eqn 11)**		
5.2	6.7	-25.2		635.5483	25.210	635.548	20.51		
21.1	39.1	-59.8		3576.119	59.801	3576.119			
29.9	38.4	-24.9		619.522	24.890	619.522			
6.2	8	-25.4		642.730	25.352	642.730			
80.3	101.9	-23.7		562.174	23.710	562.174			

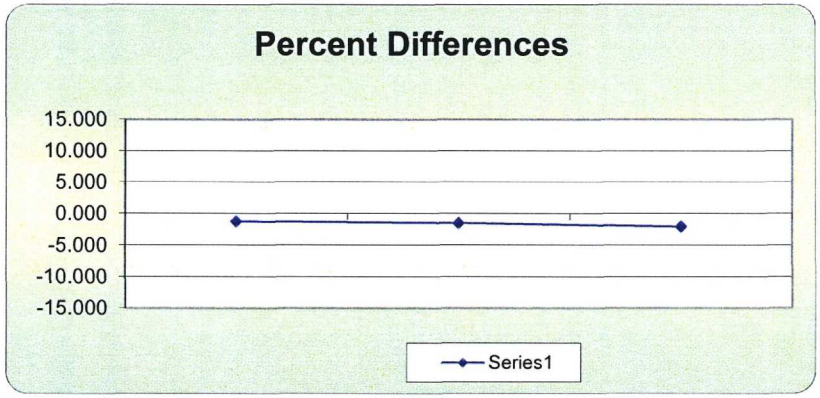


Alton Coal Development, LLC - Coal Hollow Mine

One-Point Flow Rate Bias Estimate

Site ID: Monitor 962A		Pollutant type:					Bias (%)		
Meas Val (Y)	**Audit Val (X)**	**d (Eqn. 1)**	**25th Percentile**	**d^2**	**$\|d\|$**	**$\|d\|^2$**			
16.7	16.9	-1.183	-1.764	1.401	1.183	1.401			
16.7	16.95	-1.475	**75th Percentile**	2.175	1.475	2.175	**n**	**$\Sigma\|d\|$**	**"AB" (Eqn 4)**
16.7	17.05	-2.053	-1.329	4.214	2.053	4.214	3	4.711	1.570
							n-1	**$\Sigma\|d\|^2$**	**"AS" (Eqn 5)**
							2	7.790	0.442

Bias (%) (Eqn 3)	Both Signs Positive
2.32	FALSE
Signed Bias (%)	Both Signs Negative
-2.32	TRUE



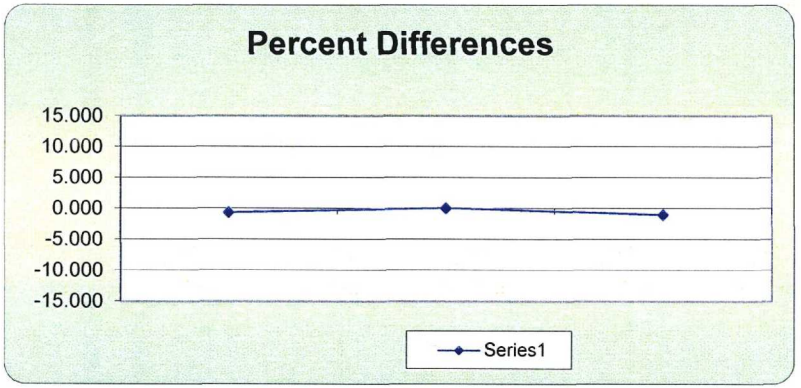
Alton Coal Development, LLC - Coal Hollow Mine

One-Point Flow Rate Bias Estimate

Site ID: Monitor 963B		Pollutant type:					Bias (%)
Meas Val (Y)	**Audit Val (X)**	**d (Eqn. 1)**	**25th Percentile**	**d^2**	**$\|d\|$**	**$\|d\|^2$**	
16.7	16.8	-0.595	-0.801	0.354	0.595	0.354	
16.7	16.68	0.120	**75th Percentile**	0.014	0.120	0.014	
16.7	16.87	-1.008	-0.238	1.015	1.008	1.015	

n	**$\sum\|d\|$**	**"AB" (Eqn 4)**
3	1.723	0.574
n-1	**$\sum\|d\|^2$**	**"AS" (Eqn 5)**
2	1.384	0.444

Bias (%) (Eqn 3)	Both Signs Positive
1.32	FALSE
Signed Bias (%)	Both Signs Negative
-1.32	TRUE

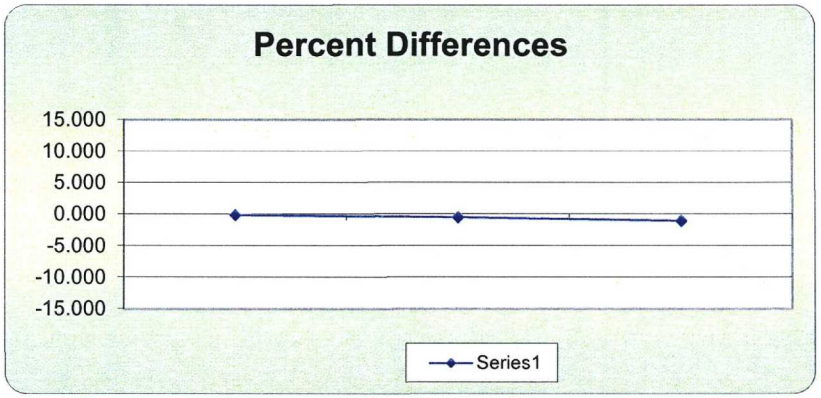


Alton Coal Development, LLC - Coal Hollow Mine

One-Point Flow Rate Bias Estimate

Site ID: Monitor 964C		Pollutant type:					Bias (%)		
Meas Val (Y)	**Audit Val (X)**	**d (Eqn. 1)**	**25th Percentile**	**d^2**	**$\|d\|$**	**$\|d\|^2$**			
16.7	16.72	-0.120	-0.772	0.014	0.120	0.014			
16.7	16.78	-0.477	**75th Percentile**	0.227	0.477	0.227	**n**	**$\Sigma\|d\|$**	**"AB" (Eqn 4)**
16.7	16.88	-1.066	-0.298	1.137	1.066	1.137	3	1.663	0.554
							n-1	**$\Sigma\|d\|^2$**	**"AS" (Eqn 5)**
							2	1.379	0.478

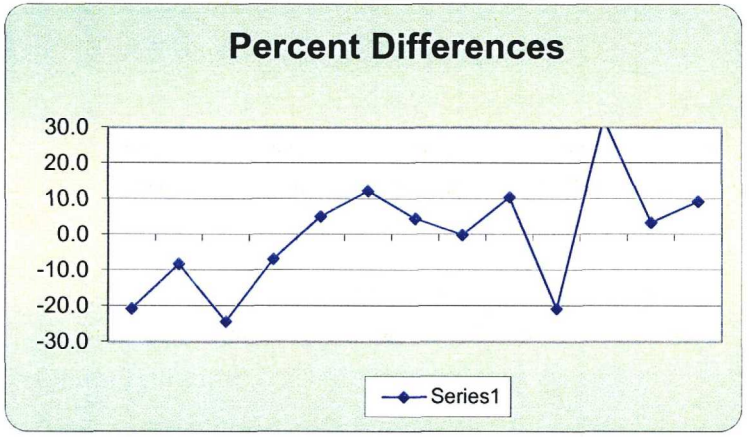
Bias (%) (Eqn 3)	Both Signs Positive
1.36	FALSE
Signed Bias (%)	Both Signs Negative
-1.36	TRUE



Alton Coal Development, LLC - Coal Hollow Mine - NPL

Precision Estimate (From Collocated Samples)

Monitors 963D & 964E		Pollutant type:					CV_{ub} (%)		
Meas Val (Y)	**Audit Val (X)**	**d (Eqn 10)**	**25th Percentile**	**d^2**	**$\|d\|$**	**$\|d\|^2$**			
50	61.5	-20.6	-8.092	425.506	20.628	425.506			
8.3	9	-8.1	**75th Percentile**	65.488	8.092	65.488	**n**	**$\Sigma\|d\|$**	**$\Sigma\|d\|^2$**
33.8	43.1	-24.2	9.278	585.023	24.187	585.023	13	157.920	3004.509
53	56.7	-6.7		45.504	6.746	45.504	**n-1**	**Σd**	**Σd^2**
29.9	28.4	5.1		26.479	5.146	26.479	12	-2.766	3004.509
16.4	14.5	12.3		151.234	12.298	151.234			
22.4	21.4	4.6		20.850	4.566	20.850			
7.5	7.5	0.0		0	0.000	0.000			
6	5.4	10.5		110.803	10.526	110.803	**CV (%) (Eqn 11)**		
5.2	6.4	-20.7		428.0618	20.690	428.062	15.44		
26.2	18.9	32.4		1047.979	32.373	1047.979			
30	29	3.4		11.491	3.390	11.491			
40.6	37	9.3		86.088	9.278	86.088			

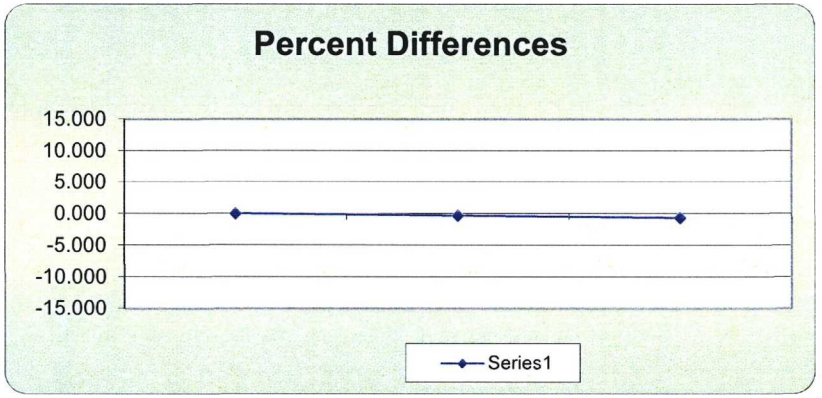


Alton Coal Development, LLC - Coal Hollow Mine

One-Point Flow Rate Bias Estimate

Site ID: Monitor 2366D		Pollutant type:					Bias (%)		
Meas Val (Y)	**Audit Val (X)**	**d (Eqn. 1)**	**25th Percentile**	**d^2**	**$\|d\|$**	**$\|d\|^2$**			
16.7	16.69	0.060	-0.476	0.004	0.060	0.004			
16.7	16.75	-0.299	**75th Percentile**	0.089	0.299	0.089	**n**	**$\Sigma\|d\|$**	**"AB" (Eqn 4)**
16.7	16.81	-0.654	-0.119	0.428	0.654	0.428	3	1.013	0.338
							n-1	**$\Sigma\|d\|^2$**	**"AS" (Eqn 5)**
							2	0.521	0.299

Bias (%) (Eqn 3)	Both Signs Positive
0.84	FALSE
Signed Bias (%)	Both Signs Negative
-0.84	TRUE

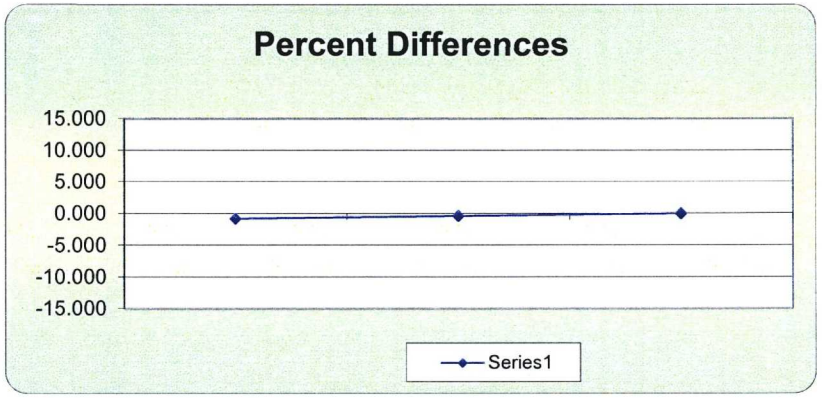


Alton Coal Development, LLC - Coal Hollow Mine

One-Point Flow Rate Bias Estimate

Site ID: Monitor 2398E		Pollutant type:					Bias (%)		
Meas Val (Y)	**Audit Val (X)**	**d (Eqn. 1)**	**25th Percentile**	**d^2**	**$\|d\|$**	**$\|d\|^2$**			
16.7	16.83	-0.772	-0.565	0.597	0.772	0.597			
16.7	16.76	-0.358	**75th Percentile**	0.128	0.358	0.128	**n**	**$\Sigma\|d\|$**	**"AB" (Eqn 4)**
16.7	16.7	0.000	-0.179	0.000	0.000	0.000	3	1.130	0.377
							n-1	**$\Sigma\|d\|^2$**	**"AS" (Eqn 5)**
							2	0.725	0.387

Bias (%) (Eqn 3)	Both Signs Positive
1.03	FALSE
Signed Bias (%)	Both Signs Negative
-1.03	TRUE



APPENDIX D

Field Data Sheets

Background Monitor 962A

Table I - Every 6th Day Sampling

Date	Time	Displayed Date	Displayed Time	Collected Filter ID#	New Filter ID#	Sample Start Time	Sample Start Date	Sampler Initials	
10-04-16	1458	10-04-16	1356	36	4	M-M	10-09-16	JKSR	
10-11-16	0933	10-11-16	0832	4	9	M-M	10-15-16	JKSR	
10-18-16	1719	10-18-16	1618	9	16	M-M	10-21-16	KN	
10-24-16	0909	10-24-16	0807	16	37	M-M	10-27	KN	
10-28-16	1133	10-28-16	1032	37	17	M-M	11-02-16	JKSR	
11-04-16	1013	11-04-16	0911	17	28	M-M	11-08-16	JKSR	Blank
11-04-16	1015	11-04-16	0913	28	22	M-M	11-08-16	JKSR	
11-09-16	1017	11-09-16	1015	22	31	M-M	11-14-16	KN	
11-16-16	1004	11-16-16	1003	31	4	M-M	11-20-16	KN	
11-23-16	1137	11-23-16	1135	4	9	M-M	11-26-16	JKSR	
11-29-16	1459	11-29-16	1457	9	15	M-M	12-02-16	JKSR	
12-5-16	1205	12-5-16	12:03	15	10	M-M	12-08-16	KN	
12-09-16	0837	12-09-16	0837	10	17	M-M	12-14-16	KN	
12-15-16	12:55	12-15-16	12:54	17	31	M-M	12-20-16	KN	
12-22-16	1316	12-22-16	1315	31	36	M-M	12-26-16	JKSR	
12-28-16	1002	12-28-16	1001	36	9	M-M	01-01-17	JKSR	Cook F

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	10:58	98	99	Pass	KN	Cleaned Manifold
11/9/16		99	96	Pass	KN	
12/9/16	0908	99	96	Pass	KN	Cleaned Manifold, applied Vaccum grease

Table III - Monthly Flow Rate Verification

Date	Time	Monitor Flow (Q Lpm)	Monitor Baro Pressure (mmHg)	Delta Cal Baro Pressure (mmHg)	Monitor Temp (A)	Delta Cal Temp (Ta)	Delta Cal Flow (Qs)	Delta Cal Flow (Qa)	Accuracy	Initials
10/6/16	1108	16.70	585	586	10.2	11.0	13.68	16.90	-1.18	KN
11/9/16		16.70	592.0	591.5	14.2	14.0		16.95	-1.48	KN
12/9/16	0913	16.70	587	588	1.8	2.9	14.20	17.05	-2.05	KN

Compliance Monitor 963B

Table I - Every 6th Day Sampling

Date	Time	Displayed Date	Displayed Time	Collected Filter ID#	New Filter ID#	Sample Start Time	Sample Start Date	Sampler Initials
10-04-16	1514	10-04-16	1414	JBR1	5	M-M	10-08-16	JKSR
10-11-16	1015	10-11-16	0914	5	14	M-M	10-15-16	JKSR
10-18-16	1703	10-18-16	1603	14	13	M-M	10-21-16	KN
10-24-16	1203	10-24-16	1129	13	38	M-M	10-28-16	KN
10-28-16	1151	10-28-16	1052	38	18	M-M	11-02-16	JKSR
11-04-16	1031	11-04-16	0930	18	23	M-M	11-08-16	JKSR
11-09-16	1055	11-09-16	1055	23	33	M-M	11-14-16	KN
11-16-16	1326	11-16-16	13:26	33	5	M-M	11-20-16	KN
11-23-16	1153	11-23-16	1152	5	11	M-M	11-26-16	JKSR
11-29-16	1512	11-29-16	1510	11	16	M-M	12-02-16	JKSR
12-5-16	1230	12-5-16	12:29	16	22	M-M	12-08-16	KN
12-9-16	0946	12-9-16	0946	22	28	M-M	12-14-16	KN
12-15-16	1314	12-15-16	1314	28	32	M-M	12-20-16	KN
12-21-16	1329	12-21-16	1328	32	37	M-M	12-26-16	JKSR
12-28-16	1021	12-28-16	1020	37	10	M-M	01-01-17	JKSR

23 Black Backfilling Robinson

CODE P

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10-6-16	1142	105	92	Pass	KN	Cleaned Manifold, adj. Fl/Ht/Weight
11-9-16		105	102	Pass	KN	
12-09-16	0941	100	96	Pass	KN	Cleaned Manifold, vaccum grease

Table III - Monthly Flow Rate Verification

Date	Time	Monitor Flow (Q Lpm)	Monitor Baro Pressure (mmHg)	Delta Cal Baro Pressure (mmHg)	Monitor Temp (A)	Delta Cal Temp (Ta)	Delta Cal Flow (Qs)	Delta Cal Flow (Qa)	Accuracy	Initials
10-6-16	1201	16.7	592	592.5	11.8	12.8	13.65	16.80	-0.60	KN
11-9-16		16.7	599	597.5	15.3	14.7		16.68	0.12	KN
12-9-16	0945	16.7	598	599.5	7.0	7.6	14.21	16.87	-1.01	KN

Co-located Monitor 964C

Table I - Every 6th Day Sampling

Date	Time	Displayed Date	Displayed Time	Collected Filter ID#	New Filter ID#	Sample Start Time	Sample Start Date	Sampler Initials	
10-04-16	1515	10-04-16	1417	JBR 7	6	M-M	10-09-16	JKSR	
10-11-16	1017	10-11-16	0913	6	25	M-M	10-15-16	JKSR	
10-18-16	1657	10-18-16	1557	25	15	M-M	10-21-16	KN	
10-24-16	1236	10-24-16	1132	15	39	M-M	10-27-16	KN	
10-28-16	1153	10-28-16	1048	39	19	M-M	11-02-16	JKSR	
11-04-16	1032	11-04-16	0937	19	24	M-M	11-08-16	JKSR	Black working on Rotameter
11-09-16	1048	11-09-16	1043	24	10	1045	11-09-16	KN	Blank
11-09-16	10:43	11-09-16	10:43	10	32	M-M	11-14-16	KN	
11-16-16	1332	11-16-16	1329	32	6	M-M	11-20-16	KN	
11-23-16	1154	11-23-16	1149	6	12	M-M	11-26-16	JKSR	
11-29-16	1514	11-29-16	1509	6	25	M-M	12-02-16	JKSR	
12-05-16	12:30	12-05-16	1231	25	23	12:35	12-05-16	KN	Blank
12-05-16	12:33	12-05-16	12:33	23	24	M-M	12-08-16	KN	
12-09-16	10:04	12-09-16	1004	24	18	M-M	12-14-16	KN	
12-15-16	1320	12-15-16	1314	18	33	M-M	12-20-16	KN	
12-21-16	1330	12-21-16	1325	33	38	M-M	12-26-16	JKSR	
12-28-16	1023	12-28-16	1017	38	11	M-M	01-01-17	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	12:02	95	92	Pass	KN	Cleaned Manifold
11/9/16		100	96	Pass	KN	
12/9/16	0957	105	103	Pass	KN	clean Manifold, unscrew grease

Table III - Monthly Flow Rate Verification

Date	Time	Monitor Flow (Q Lpm)	Monitor Baro Pressure (mmHg)	Delta Cal Baro Pressure (mmHg)	Monitor Temp (A)	Delta Cal Temp (Ta)	Delta Cal Flow (Qs)	Delta Cal Flow (Qa)	Accuracy	Initials
10/6/16	~~12:06~~ 1001	~~16.71~~ 16.76	593	592.5	12.1	12.7	13.59	16.72	-0.12	KN
11/9/16		16.70	597	597.5	14.6	14.5		16.78	-0.48	KN
12/09/16	1001	16.76	596	595	2.5	3.3	19.29	16.88	-1.07	KN

Compliance Monitor 2366D

Table I - Every 6th Day Sampling

Date	Time	Displayed Date	Displayed Time	Collected Filter ID#	New Filter ID#	Sample Start Time	Sample Start Date	Sampler Initials
10-04-16	1528	10-04-16	1423	JBR 8	7	M-M	10-07-16	JKSR
10-11-16	1033	10-11-16	0928	7	29	M-M	10-15-16	JKSR
10-18-16	16:37	10-18-16	16:31	29	11	M-M	10-21-16	KN
10-24-16	1355	10-24-16	1349	11	40	M-M	10-27-16	KN
10-28-16	1205	10-28-16	1059	40	20	M-M	11-02-16	JKSR
11-04-16	1044	11-04-16	0938	20	26	M-M	11-08-16	JKSR
11-09-16	1131	11-09-16	1125	26	34	M-M	11-14-16	KN
11-16-16	1246	11-16-16	1342	34	7	M-M	11-20-16	KN
11-23-16	1205	11-23-16	1158	7	13	M-M	11-26-16	JKSR
11-29-16	1526	11-29-16	1519	13	29	M-M	12-02-16	JKSR
12-05-16	1256	12-05-16	1249	29	26	M-M	12-08-16	KN
12-09-16	1059	12-09-16	1059	26	19	M-M	12-14-16	KN
12-15-16	1481	12-15-16	1400	19	34	M-M	12-18-16	KN
12-22-16	1342	12-22-16	1340	34	39 Blank	1341	12-21-16	JKSR
12-22-16	1345	12-22-16	1344	39 Blank	40	M-M	12-26-16	JKSR
12-28-16	1037	12-28-16	1035	40	12	M-M	01-01-17	JKSR

Chamber Open
Blank

CODES - P, F

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	1330	105	104	Pass	KN	cleaned Manifold
11/9/16		99	97	Pass	KN	
12/09/16	1106	94	92	Pass	KN	cleaned Manifold, vac. grease seals

Table III - Monthly Flow Rate Verification

Date	Time	Monitor Flow (Q Lpm)	Monitor Baro Pressure (mmHg)	Delta Cal Baro Pressure (mmHg)	Monitor Temp (A)	Delta Cal Temp (Ta)	Delta Cal Flow (Qs)	Delta Cal Flow (Qa)	Accuracy	Initials
10/6/16	1333	16.7	591	592	13.3	14.1	13.48	16.69	-0.06	KN
11/9/16		16.7	595	596.5	17.3	16.1		16.75	-0.30	KN
12/9/16	1110	16.70	594	594	5.0 °C	6.4	14.02	16.81	-0.65	KN

Co-located Monitor 2398E

Table I - Every 6th Day Sampling

Date	Time	Displayed Date	Displayed Time	Collected Filter ID#	New Filter ID#	Sample Start Time	Sample Start Date	Sampler Initials	
10-04-16	1530	10-04-16	1424	JBR 11	8	M-M	10-09-16	JKSR	
10-11-16	1035	10-11-16	0929	8	30	M-M	10-15-16	JKSR	
10-18-16	1641	10-18-16	1535	30	12	M-M	10-21-16	KN	
10-24-16	1359	10-24-16	1352	12	41	M-M	10-27-16	KN	
10-28-16	1206	10-28-16	1059	41	21	M-M	11-02-16	JKSR	
11-04-16	1046	11-04-16	0939	21	27	M-M	11-08-16	JKSR	
11-09-16	1148	11-09-16	1141	27	35	M-M	11-14-16	KN	
11-16-16	1354	11-16-16	1346	35	8	M-M	11-20-16	KN	
11-23-16	1207	11-23-16	1159	8	14	M-M	11-26-16	JKSR	
11-29-16	1528	11-29-16	1519	14	30	M-M	12-02-16	JKSR	
12-05-16	1303	12-05-16	1255	30	27	M-M	12-08-16	KN	
~~12-09-16~~	~~[illegible]~~	~~12-09-16~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	
12-09-16	1117	1209	1116	27	21	11:18	12/9/16	KN	Blank
12-09-16	1126	12-09-16	1126	21	20	M-M	12/14/16	KN	
12-15-16	1446	12-15-16	1444	20	35	M-M	12/20/16	KN	
12-22-16	1346	12-22-16	1344	35	41	M-M	12-21-16	JKSR	
12-28-16	1038	12-28-16	1036	41	13	M-M	01-01-17	JKSR	

Table II - Monthly Leak Test

Date	Time	Initial SP Value	Final SP Value	Pass/Fail	Initials	Maintenance
10/6/16	1337	95	95	Pass	KN	Cleaned Manifold
11/9/16		98		Fail	KN	adjusted filter cartridge height
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
12/09/16	1120	108	106	Pass	KN	cleaned Manifold, grease

Table III - Monthly Flow Rate Verification

Date	Time	Monitor Flow (Q Lpm)	Monitor Baro Pressure (mmHg)	Delta Cal Baro Pressure (mmHg)	Monitor Temp (A)	Delta Cal Temp (Ta)	Delta Cal Flow (Qs)	Delta Cal Flow (Qa)	Accuracy	Initials
10/6/16	1340	16.70	591	592	14.2	14.9	13.57	16.83	-0.77	KN
11/9/16		16.70	597	596.5	15.9	16.0		16.76	-0.36	KN
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~		~~[illegible]~~
12/09/16	1125	16.70	594	594	4.8	5.4	13.96	16.70	0	KN

APPENDIX E

Independent PM_{10} Sampler Performance Audit Report

AUDIT REPORT
FOR

ALTON COAL DEVELOPMENT, LLC
COAL HOLLOW MINE
ALTON, UTAH
FOURTH QUARTER 2016

Prepared for

Kirk Nicholes
Alton Coal Development, LLC
463 N 100 W
Cedar City, Utah, 84721

Prepared by

Air Resource SPECIALISTS

1901 Sharp Point Drive, Suite E
Fort Collins, CO 80525
970-484-7941

Site Audited: November 9, 2016

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Air Resource Specialists, Inc. (ARS) conducted a performance audit of Alton Coal Development, LLC ambient air quality monitoring systems on November 9, 2016. The monitoring sites are located at the Coal Hollow Mine near Alton, Utah.

Table 1-1

Site Location Information

	Primary CHM	Background	Primary NPL	Meteorological
Latitude	37° 24' 5.0" N	37° 24' 20.9" N	37° 24' 43" N	37° 23' 53.2" N
Longitude	112° 27' 21.0" W	112° 26' 1.1" W	112° 27' 30.6" W	112° 26' 43.1" W
UTM	12S 371147 4140396	12S 373119 4140856	12S 370928 4141570	12S 372073 4140018
Elevation	6,890 feet MSL	7,158 feet MSL	6,959 feet MSL	7,007 feet MSL

Audit results for the particulate samplers are summarized in Table 1-2. Audit results for the meteorological measurements are summarized in Table 1-3. Detailed discussions of performance audit findings and other findings can be found in Section 3.0.

Table 1-2

Summary of Particulate Sampler Audit Results

	Parameter	**Instrument**	**Within Accuracy Goal**
Primary CHM	PM_{10}	BGI PQ200S	Yes
	PM_{10} (collocated)	BGI PQ200S	Yes
Background #1	PM_{10}	BGI PQ200S	Yes
Primary NPL	PM_{10}	BGI PQ200	Yes
	PM_{10} (collocated)	BGI PQ200	Yes*

*Failed leak check. See Section 3.0.

Table 1-3

Summary of Meteorological Audit Results

Parameter	**Sensor**	**Within Accuracy Goal**
Wind Speed	Met-One 34B	Yes
Wind Direction	Met-One 34B	Yes
Temperature	Campbell Scientific 107	Yes
Precipitation	Hydrological Services TB4	No

Details of the audit are presented in the following sections:

Section 2.0	Audit Methods and Equipment
Section 3.0	Audit Results
Appendix A	Audit Data Forms
Appendix B	Audit Standards Certifications

Any questions related to this audit or audit report should be addressed to:

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Quality Assurance Officer / Lead Auditor
Air Resource Specialists, Inc.
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Fort Collins, Colorado 80525
Telephone: 970-484-7941
Fax: 970-484-3423
E-mail: ckirk@air-resource.com

2.0 AUDIT METHODS

Audit procedures, audit challenge ranges, and acceptance criteria are described below. These ranges and limits conform to EPA's PSD guidelines. Audit results were verbally communicated to the site operator prior to departure from the site. A follow-up e-mail summarizing audit findings was also sent to Alton Coal Development, LLC personnel. Audit details are provided in Appendix A.

Guidance from the following EPA documents was used to establish the audit procedures:

- 40 CFR 58, Appendix A. *Quality Assurance Requirements for SLAMS, SPMs, and PSD Air Monitoring*
- EPA *Quality Assurance Handbook for Air Pollution Measurement Systems:*
  - *Volume I. A Field Guide to Environmental Quality Assurance*
  - *Volume II. Ambient Air Quality Monitoring Program*
  - *Volume IV. Meteorological Measurements*
- EPA *Meteorological Monitoring Guidance for Regulatory Modeling Applications*
- EPA *Transfer Standards for Calibration of Air Monitoring Analyzers for Ozone*

2.1 PARTICULATE SAMPLERS (FRM PM_{10})

The filter-based FRM PM_{10} particulate samplers are audited in their normal operating mode. ARS audits the samplers with a BGI deltaCal audit standard which measures flow, temperature, and barometric pressure. Prior to conducting the flow audit, a system leak check is performed in accordance with the manufacturer's specifications. The observed volumetric operational flow and design flow of the sampler are compared to the audit flows measured by the audit standard. Differences between the operational sampler flow and audit flow that are greater than ±10% are considered out of tolerance. Differences between the designated design flow and the audit flow greater than ±10% are considered out of tolerance. In addition to the flow audits, observed ambient temperature, filter temperature, and barometric pressure measurements of the particulate samplers are also audited by comparison to the audit standard. A temperature difference greater than ±2°C and a barometric pressure difference greater than ±10mm Hg are considered out of tolerance. Audit methods and acceptable criteria for the particulate samplers are summarized in Table 2-1.

Table 2-1

Particulate Samplers
Audit Acceptance Criteria

Parameter	Audit Method	Acceptance Criteria
FRM PM_{10}	Leak Check	Manufacturer specs
	Audit flow to actual sampler flow	≤ ± 4%
	Design criteria flow to audit flow	≤ ± 5%
	Audit temperature to sampler temperature	≤ ± 2 °C
	Audit temperature to sampler filter temperature	≤ ± 2 °C
	Audit barometric pressure to sampler pressure	≤ ±10mm Hg

Table 2-2

Particulate Samplers
Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
FRM Flow	BGI	DeltaCal	1237	1/15/2017

2.2 METEOROLOGICAL PARAMETERS

Meteorological measurement systems are audited in accordance with (and accuracy goals were obtained from) the EPA's *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume IV – Meteorological Measurements*, (March 2008). ARS uses National Institute of Standards and Technologies (NIST) traceable test equipment for all meteorological parameters. All equipment is recertified annually. Audit ranges and acceptable criteria for each parameter are summarized in Table 2-3.

2.2.1 Wind Speed

Wind speed sensors are audited using an R.M. Young model 18802 (high RPM) or 18811 (low RPM) pulsed motor wind speed calibrator. Each sensor is tested at zero and five shaft revolution speeds. The equivalent wind speed is calculated corresponding to the sensor manufacturer's specified values for shaft speed versus wind velocity and compared to readings obtained from the on-site datalogger.

2.2.2 Wind Direction

Wind direction sensor audits include the verification of sensor orientation, linearity, and starting threshold (bearing integrity). The sensor orientation accuracy is verified by a reference. The reference can be an internal reference (a tower-mounted alignment vane) or external (pointing at landmarks from the sensor). Accuracy of the references is verified by the solar azimuth method for the determination of true north. Using a compass and the site latitude and longitude, a computer model outputs the sun's azimuth for that exact time of day. The compass is adjusted to that azimuth, effectively correcting for the compass to the local magnetic declination (which may include local magnetic field disturbances). The sensor orientation accuracy is checked by aligning the wind direction vane to and from each landmark reference, recording sensor responses from the on-site datalogger.

Potentiometer linearity is tested by verifying the change in response between two successive orientations across eight points on a calibrated disc mounted atop the sensor. For example, any two adjacent orientations on the eight-point disc are separated by 45 degrees. The difference in the datalogger response for these two adjacent orientations is compared to this value.

2.2.3 Ambient Temperature

Temperature sensors that are non-immersible are audited by collocation of the audit sensor under ambient conditions utilizing similar methods of sensor aspiration. Collocated comparisons are typically carried out using hourly averages. Audit data are collected by a datalogger provided by the auditor. Temperature sensors that are immersible are audited by comparison to the audit sensor in water baths. The test baths are typically at 0°C, near ambient conditions (or approximately 25°C), and near the full scale of the sensor (typically near 50°C). Data observed on the on-site datalogger are used to assess the accuracy of sensors. Sensor aspirators are inspected for proper function, including fan function and flow direction.

2.2.4 Precipitation

The tipping bucket style precipitation gauges are audited with a volumetric precipitation gauge calibrator by transferring a known amount of water through the gauge orifice at a maximum rate equivalent to 2.0 inches/hour of precipitation. The total values from the on-site datalogger values are compared to the actual introduced volume. The level and cleanliness of the sensor is observed where possible.

Table 2-3

Meteorological Sensors
Audit Ranges and Acceptance Criteria

Parameter	Audit Method	Acceptance Criteria
Wind Speed	Accuracy at five speeds with anemometer drive	$\leq \pm 0.2$ m/s
	Starting threshold with torque gauge	Manufacturer specs
Wind Direction	Accuracy with compass	$\leq \pm 5^{\circ}$
	Linearity	$\leq \pm 5^{\circ}$
	Starting threshold with torque gauge	Manufacturer specs
Ambient Temperature (non-immersible sensor)	Accuracy via collocation in ambient conditions	$\leq \pm 0.5^{\circ}$
Ambient Temperature (immersible sensor)	Accuracy via collocation in three water baths	$\leq \pm 0.5^{\circ}$
Precipitation	Accuracy via known volume of water	$\leq \pm 10\%$

Table 2-4

Meteorological Audit Equipment

References	Manufacturer	Model Number	Serial Number	Expiration Date
Wind Speed (high rpm)	R.M. Young	18802	CA03359	4/7/2017
Wind Direction Orientation	Brunton	Transit	5103212072	N/A
Temperature (immersible)	Eutechnics	4400	307635	3/28/2017
Precipitation	Novalynx	260-2595	N/A	N/A

3.0 AUDIT RESULTS

Audit findings and recommendations are discussed below. Detailed audit results are provided in Appendix A.

Performance Audit Results

- The leak check on the collocated sampler at the Primary NPL site failed. After adjustment by the operator, it passed. This leak did not appear to impact flow and, consequently, should not impact data.
- Although the collocated sampler at the Primary CHM site passed all performance audit requirements, the water collection jar on the PM_{10} inlet was found broken. This could significantly impact the particle size collection and the apparent concentration measured.
- The precipitation gauge was found responding outside of audit requirements. It is recommended that the gauge be challenged again and adjusted, if required.
- The clock for Campbell Scientific CR510 data logger at the meteorological station was set to Mountain Daylight Time. The clock should always be set to Mountain Standard Time.

APPENDIX A

AUDIT DATA FORMS

Air Resource SPECIALISTS

TEMPERATURE / DELTA-TEMPERATURE SYSTEM AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Temperature Reference	Eutechnics	4400	307635	3/28/2017

2m Temperature Sensor	
Manufacturer	Campbell Scientific
Model	107
Serial Number	10755-14 / WO#1272

List sensors according to height on tower, from highest to lowest.

Temp. Deltas

CALIBRATION ACCEPTANCE CRITERIA (<=)	
Ambient Temperature Difference (°C)	0.5
Vertical Temperature Difference (°C)	0.1

AS FOUND	2m Temperature		
Bath Temp (°C)	DAS	Difference	
0.03	0.16	0.13	PASS
15.20	15.46	0.26	PASS
30.15	30.33	0.18	PASS
MAX ABS Difference		0.26	PASS

MAX ABS Difference						

Aspirator fan functional 2m?	☐ Yes ☐ No ☑ N/A	
	☐ Yes ☐ No ☐ N/A	
	☐ Yes ☐ No ☐ N/A	
	☐ Yes ☐ No ☐ N/A	

Each sensor was verified against its data channel ?
☐ Yes ☐ No ☑ N/A
Each Temperature Difference = Upper - Lower ?
☐ Yes ☐ No ☑ N/A

NOTES:	

Air Resource SPECIALISTS

WIND SPEED SENSOR AUDIT

ABBR.	n/a	CLIENT	ALTON	FIELD SPECIALIST	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Wind Speed Reference	RM Young	18802	CA03359	4/7/2017
Wind Speed Torque Gauge				

Manufacturer and Model	Met One - 034B
Sensor Serial #	E2281
Cups Serial #	N/A

AUDIT CRITERIA (<=)	
Wind Speed Difference (m/s)	0.20
Wind Speed Difference (%)	N/A

Select UNITS	m/s

		Wind Speed			
Motor Speed (rpm)	Target Speed	DAS	Difference		
0	0.000	0.000	N/A	N/A	N/A
100	2.943	2.920	-0.02		PASS
200	5.607	5.630	0.02		PASS
300	8.270	8.270	0.00		PASS
600	16.260	16.340	0.08		PASS
1800	48.220				

Starting Threshold	TORQUE
Torque <= 0.2 g-cm	

Heater sleeve functional?	☐ Yes	☐ No	☑ N/A

NOTES:

Air Resource SPECIALISTS

WIND DIRECTION AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Direction Alignment Reference	Brunton	Transit	5103212072	
Direction Linearity Reference				
Direction Torque Gauge				

Manufacturer & Model	Met One - 034B
Sensor Serial #	E2281
Vane Serial #	N/A

Local Magnetic Declination (degrees)	0.0
Method	n/a

Mag. Dec. from NOAA (deg/min/sec)				0.00

http://www.ngdc.noaa.gov/geomag-web/#declination

AUDIT CRITERIA (<=)	
Cross-arm Alignment Error (degrees)	2
Total Align. Diff (degrees)	5
Sensor Linearity (degrees)	5

Landmarks	Degrees
To left most building/barn to the east	338
From left most building/barn to the east	158
From center of right rock outcrop, saddle	73
To center of right rock outcrop, saddle	253

Reference Alignment Error (degrees)	0.0	PASS

SENSOR ALIGNMENT			
Reference	Degrees	DAS	Difference
From the North	0		
From the South	180		
From the East	90		
From the West	270		
Total Alignment MAX ABS Diff			

OR

SENSOR ALIGNMENT				
Landmark	Degrees	DAS	Difference	
ost building/barn to	338	338.0	0.0	
most building/barn t	158	157.0	-1.0	
er of right rock outcr	73	73.0	0.0	
of right rock outcro	253	253.0	0.0	
Total Alignment MAX ABS Diff			1.0	PASS

SENSOR LINEARITY			
Point	DAS	Difference	
1		N/A	
2			
3			
4			
5			
6			
7			
8			
1			
MAX Difference			

Starting Threshold	TORQUE
Torque <= 6.5 g-cm	

Heater sleeve functional? ☐ Yes ☐ No ☑ N/A

NOTES:

Air Resource SPECIALISTS

PRECIPITATION SENSOR AUDIT

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
Precipitation Reference	Novalynx	260-2595	N/A	

Manufacturer	Hydrological Services
Model	TB4
Serial Number	05-94

AUDIT CRITERIA (<=)	
Difference from Input Volume (%)	0%

	Reference Chart			Input Volume (mL)		946
	Manufacturer	Model	Diameter (in.)	mm/tip	mL/tip	DAS target
	Met One	385	12	0.254	18.53	12.96
	RM Young	52202	6.2825	0.100	2.00	47.30
	Climatronics	100097-1-G0-H0	8	0.254	8.24	29.17
	Climatronics	100508	9.66	0.100	4.73	20.01
X	Hydrological Serv.	TB4	8	0.254	8.24	29.17

Conversions			
Value	Units	Value	Units
1.000	inch	25.40	mm
25.40	mm	1.000	inch

		Precipitation		
Reference (mL)	Target (mm)	DAS (mm)	Difference	
946	29.17	22.61	-22.5%	FAIL

Heater functional?	☐ Yes	☐ No	☑ N/A

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	962A

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 min

SETTINGS	
Total Flow	16.70

	Automated LEAK CHECK	
	Vacuum Loss Rate	Pass/Fail
	3 cm H2O	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.95	16.70	-1.5%	1.5%	PASS

AUDIT CRITERIA (<=)	
Actual Flow % Diff	10%
Design Flow % Diff	10%

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	14.0	14.2	0.2	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	12.8	12.2	-0.6	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	591.5	591.0	-0.5	PASS

AUDIT CRITERIA (<=)	
Pressure Difference (mmHg)	10

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N963B

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-4 min

SETTINGS	
Total Flow	16.70

	Automated LEAK CHECK	
	Vacuum Loss Rate	Pass/Fail
	3 cm H2O	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.68	16.70	0.1%	-0.1%	PASS

AUDIT CRITERIA (<=)	
Actual Flow % Diff	10%
Design Flow % Diff	10%

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	14.7	15.3	0.6	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	15.0	15.3	0.3	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	597.5	599.0	1.5	PASS

AUDIT CRITERIA (<=)	
Pressure Difference (mmHg)	10

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200S
SERIAL NUMBER	N964C

Date and Time correct?
☑ Yes ☐ No
If no, time off by:
0 min

SETTINGS	
Total Flow	16.70

	Automated LEAK CHECK	
	Vacuum Loss Rate	Pass/Fail
	4 cm H2O	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.78	16.70	-0.5%	0.5%	PASS

AUDIT CRITERIA (<=)	
Actual Flow % Diff	10%
Design Flow % Diff	10%

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	14.5	14.6	0.1	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	597.5	597.0	-0.5	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	14.3	14.4	0.1	PASS

AUDIT CRITERIA (<=)	
Pressure Difference (mmHg)	10

NOTES: broken jar on PM10 inlet

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	2366D

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-6 min

SETTINGS	
Total Flow	16.70

	Automated LEAK CHECK	
	Vacuum Loss Rate	Pass/Fail
	2 cm H2O	PASS

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.75	16.70	-0.3%	0.3%	PASS

AUDIT CRITERIA (<=)	
Actual Flow % Diff	10%
Design Flow % Diff	10%

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	15.6	15.5	-0.1	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	16.1	17.3	1.2	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	596.5	595.0	-1.5	PASS

AUDIT CRITERIA (<=)	
Pressure Difference (mmHg)	10

NOTES:

Air Resource SPECIALISTS

FRM AUDIT (PM_{10})

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollov					

	MANUFACTURER	MODEL	SERIAL NUMBER	EXPIRATION DATE
PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017

MANUFACTURER	BGI
MODEL	PQ200
SERIAL NUMBER	

Date and Time correct?
☐ Yes ☑ No
If no, time off by:
-7 min

SETTINGS	
Total Flow	16.70

	Automated LEAK CHECK	
	Vacuum Loss Rate	Pass/Fail
		FAIL

	FLOW VERIFICATION				
	Reference	Instrument	Actual Diff	Design Diff	
Total Flow	16.76	16.70	-0.4%	0.4%	PASS

AUDIT CRITERIA (<=)	
Actual Flow % Diff	10%
Design Flow % Diff	10%

	AMBIENT TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	16.0	15.9	-0.1	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	FILTER TEMPERATURE SENSOR (°C)			
	Reference	Instrument	Difference	
	596.5	597.0	0.5	PASS

AUDIT CRITERIA (<=)	
Temperature Difference (°C)	2

	PRESSURE SENSOR (mmHg)			
	Reference	Instrument	Difference	
	16.3	17.5	1.2	PASS

AUDIT CRITERIA (<=)	
Pressure Difference (mmHg)	10

NOTES: Subsequent leak check passed following adjustment by operator. Flow does not appear to be impacted.

Air Resource SPECIALISTS

SITE INFORMATION

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
NETWORK TYPE		Alton Coal- Coal Hollow					

		Deg	Min	Sec		Decimal
LATITUDE	North	37	23	53.2	--CALCULATE->	37.3981
LONGITUDE	West	112	26	43.1		112.4453

Decimal

--CALCULATE->

Deg	Min	Sec

	Meters		Feet
ELEVATION		--CALCULATE->	

Feet		Meters
	--CALCULATE->	

Please verify site standards used by the site operator

SITE STANDARDS	MANUFACTURER	MODEL	SERIAL #	Calibration Expiration Date
PM Flow Reference				

NOTES: Lat/Long for met station

Air Resource SPECIALISTS

CALIBRATION AND VERIFICATION STANDARDS

ABBR.	n/a	CLIENT	ALTON	AUDITOR	C.Kirk	DATE	11/9/2016
SITE NAME		Coal Hollow Mine					
Network type		Alton Coal- Coal Hollow					

	MANUFACTURER	MODEL	SERIAL #	Calibration Expiration Date
Ozone Transfer Standard				
Gas Dilution Transfer Standard				
MFC High Flow Reference				
MFC Low Flow Reference				
Temperature Reference	Eutechnics	4400	307635	3/28/2017
AT/RH Sensor Reference				
Barometric Pressure Reference				
Wind Speed Reference (high rpm)	RM Young	18802	CA03359	4/7/2017
Wind Speed Reference (low rpm)				
Wind Speed Torque Gauge				
Wind Direction Alignment Reference	Brunton	Transit	5103212072	
Wind Direction Linearity Reference				
Wind Direction Torque Gauge				
Solar Radiation Reference				
Multiplier		W/m2 / mV		
UV Radiation Reference				
Multiplier		W/m2 / mV		
Precipitation Reference				
Volume	946	mL	Novalynx	260-2595	N/A	

PM Flow Standard #1	BGI	deltaCal	1237	1/15/2017
PM Flow Standard #2				
PM Flow Standard #3				
PM Flow Standard #4				

PM Temperature Standard #1	BGI	deltaCal	1237	1/15/2017
PM Temperature Standard #2				
PM Temperature Standard #3				
PM Temperature Standard #4				

PM Barometric Pressure Standard #1	BGI	deltaCal	1237	1/15/2017
PM Barometric Pressure Standard #2				
PM Barometric Pressure Standard #3				
PM Barometric Pressure Standard #4				

TEOM MTV Standard				

HiVol Direct Flow Reference				
Orifice				
ΔP orifice manometer				

APPENDIX B

AUDIT STANDARDS CERTIFICATIONS

MICRO PRECISION CALIBRATION
22835 INDUSTRIAL PLACE
GRASS VALLEY CA 95949
530-268-1860

Certificate of Calibration

Date: Mar 28, 2016 **Cert No. 222008122912902**

Customer:
AIR RESOURCE SPECIALIST, INC
1901 SHARP POINT DR, STE E
FORT COLLINS CO 80525

MPC Control #:	AX7278
Asset ID:	N/A
Gage Type:	DIGITAL THERMOMETER
Manufacturer:	EUTECHNICS
Model Number:	4400
Size:	N/A
Temp/RH:	70.0°F / 38.0%

Work Order #:	SAC-70077720
Purchase Order #:	A30449
Serial Number:	307635
Department:	N/A
Performed By:	JAKE WEST
Received Condition:	IN TOLERANCE
Returned Condition:	IN TOLERANCE
Cal. Date:	March 28, 2016
Cal. Interval:	12 MONTHS
Cal. Due Date:	March 28, 2017

Calibration Notes:

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CR6700	DOUBLE WELL BATH	7013	79006	HART	Oct 14, 2016	222008122697272
DA8367	PRECISION PLATINUM RESISTANCE THERMOMETER SPRT W/ CASE	8167-25	1803221	LEEDS & NORTHRUP	Apr 27, 2016	818600

Procedures Used in this Event

Procedure Name	Description
MPC-00074	Temperature Devices

Calibrating Technician: Jake West
JAKE WEST

QC Approval: Brian Gold
BRIAN GOLD

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with EA's Publication and NIST Technical Note 1297, 1994 Edition. Services rendered comply with ISO 17025:2005, ANSI/NCSL Z540-1, MPC Quality Manual, MPC CSD and with customer purchase order instructions.

Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. The information on this report, pertains only to the instrument identified.

CERTIFICATE OF CALIBRATION AND TESTING

MODEL: **18802** (Comprised of Models 18820A Control Unit & 18830A Motor Assembly)
SERIAL NUMBER: CA03359

R. M. Young Company certifies that the above equipment was inspected and calibrated prior to shipment in accordance with established manufacturing and testing procedures. Standards established by R.M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology.

Nominal Motor Rpm	27106D Output Frequency Hz (1)	Calculated Rpm (1)	Indicated Rpm (2)
300	50	300	300
2700	450	2700	2700
5100	850	5100	5100
7500	1250	7500	7500
10,200	1700	10,200	10,200
12,600	2100	12,600	12,600
15,000	2500	15,000	15,000
☒ Clockwise and Counterclockwise rotation verified			

(1) Measured frequency output of RM Young Model 27106D standard anemometer attached to motor shaft 27106D produces 10 pulses per revolution of the anemometer shaft
(2) Indicated on the Control Unit LCD display

* Indicates out of tolerance

☐ New Unit	☒ Service / Repair Unit ☒ No Calibration Adjustments Required	☐ As Found ☐ As Left

Traceable frequency meter used in calibration Model: DP5740 SN: 4863

Date of inspection 7 Apr 2016
Inspection Interval One Year

Tested By EC

Mesa Labs 10 Park Place Butler, NJ 07405
NIST Traceable Calibration Facility, ISO 9001:2008 Registered

MesaLabs

CERTIFICATE OF CALIBRATION - NIST TRACEABILITY

(Refer to instruction manual for further details of calibration)

deltaCal Serial Number: **1237** DATE: 15-Jan-2016

Calibration Operator: P.Pitty

Critical Venturi Flow Meter: Max Uncertainity = 0.346%
Serial Number: 1A *CEESI NVLAP NIST Data File 07BGI-0001*
Serial Number: 2A *CEESI NVLAP NIST Data File 07BGI-0003*
Serial Number: 5C COX Nist Data File CCAL33222 - 5 C
Serial Number: 4A *CEESI NVLAP NIST Data File 07BGI-0002*
Serial Number: 3A *CEESI NVLAP NIST Data File 07BGI-0004*

Room Temperature: Uncertainity=0.071% Room Temperature: 24.8 °C
Brand: Accu-Safe Serial Number: 254881
NIST Traceability No. 516837
deltaCal:
Ambient Temperature (set): 24.8 °C
Aux (filter) Temperature (set): 24.8 °C

Barometric Pressure ans Absolute Pressure
Vaisala Model PTB330(50-1100) Digital Accuracy: 0.03371%
S/N DH0850001
NIST Traceable (Princo Primary Standard Model 453 S/N W12537) Certificate No. P-7485
deltaCal:
Barometric pressure (set): 746 mm of Hg

Results of Venturi Calibration
Flow Rate (Q) vs. Pressure Drop (ΔP). Where: Q=Lpm, ΔP= Cm of H2O

Q= 3.88294 ΔP ^ 0.52106 Overall Uncertainty: 0.35%
Q= 3.78777 ΔP ^ 0.54863 Overall Uncertainty: 0.35%

Date Placed In Service 1/26/16
(To be filled in by operator upon receipt)
Recommended Recalibration Date 1/26/17
(12 months from date placed in service)

Revised: September 2015
Cal102-01T2 Rev D

To Check a deltaCal 15-Jan-16 P.Pitty

1.5-19.5 VER 4.00P

BP= 746 mm of Hg

Maximum allowable error at any flow rate is .75%.

Serial No. 1237

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 2	145.17	24.75	1.658	1.651	-0.42
	188.07	24.75	2.162	2.155	-0.34
	318.63	24.75	3.697	3.710	0.34
	402.50	24.75	4.684	4.700	0.35
	473.53	24.75	5.519	5.550	0.57
#1	150.00	24.90	6.008	6.000	-0.13
	259.53	24.90	10.507	10.463	-0.42
	337.29	24.90	13.702	13.671	-0.22
	398.26	24.90	16.207	16.180	-0.16
	476.34	24.90	19.414	19.454	0.21
				Average %	-0.02

To Check a deltaCal 15-Jan-16 Pre-Recert

1.5-19.5 VER 3.41P

BP= 746 mm of Hg

Maximum allowable error at any flow rate is .75%.

Serial No. 1237

	Reading Abs. P Crit. Vent. mm of Hg	Room Temp	CV Qa Flow Lpm	Qa deltaCal Indicated	% Error
# 5	151.5	24.7	4.99	5.01	0.42
	258.5	24.7	8.67	8.60	-0.80
	343.1	24.7	11.58	11.49	-0.77
	455.5	24.7	15.45	15.14	-1.98
	566.3	24.7	19.26	18.94	-1.64
				Average %	-0.95